SKETCHES

OF

THE MOST PREVALENT

DISEASES OF INDIA:

COMPRISING

A TREATISE

ON THE

EPIDEMIC CHOLERA OF THE EAST;

STATISTICAL AND TOPOGRAPHICAL REPORTS

OF THE DISEASES IN THE DIFFERENT DIVISION OF THE ARMY UNDER THE MADRAS PRESIDENCY; EMBRACING ALSO THE ANNUAL RATE OF MORTALITY, &c.

PRACTICAL OBSERVATIONS

ON THE EFFECTS OF CALOMEL ON THE ALIMENTARY CANAL, AND ON THE DISEASES MOST PREVALENT IN INDIA.

ALSO,

AN INQUIRY

INTO CHRONIC INFLAMMATIONS AND ABSCESS OF THE LIVER.

ILLUSTRATED BY TABLES AND PLATE.

By JAMES ANNESLEY, Esq.

MADRAS MEDICAL ESTABLISHMENT;

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TO

SIR JAMES MACGRIGOR, KNT, M.D. F.R.S.

FELLOW OF THE ROYAL COLLEGES OF PHYSICIANS OF LONDON AND EDINBURGH; PHYSICIAN EXTRAORDINARY TO HIS MAJESTY; DIRECTOR-GENERAL OF THE ARMY MEDICAL DEPARTMENT, &c. &c. &c.

MY DEAR SIR,

By inscribing this Volume to you, I gratify a desire of publishing my sense of your zealous and well-directed efforts to promote the general and professional science of the members of the public service over which you preside, and to state my belief, that I only share this sentiment in common with the whole Medical Service of India. Your endeavours to promote the advancement of science, by encouraging inquiry among the members of the medical department of His MAJESTY'S Army abroad, as well as at home, and your exertions to advance their respectability and interests as a scientific and learned body, have been reflected upon the Medical Service of India, and upon the Profession generally.

Anxious that my Volume should appear under the Patronage of your distinguished merit, I am happy in thinking that it will be thus honoured by a Physician who has had extensive experience of the country, and of the diseases to which it relates, and whose Writings respecting them are so justly esteemed by every competent judge.

I have the honour to be,

My dear Sir,

Your very obedient Servant,

J. ANNESLEY.

London, 8*th September*, 1828.

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PREFACE.

There are few diseases which have excited more interest among medical men, or more terror in the mind of the Indian community at large, than the epidemic cholera. The various and contradictory views entertained at different times respecting it, shew distinctly our ignorance of the real nature of the disease itself, as well as of any successful means of combating it. During such uncertainty it is the duty of every practitioner who has had extensive experience, or who considers that he can add to the stock of information respecting it, to contribute whatever may be in his possession. It is only by such means that sufficient data can be obtained, whence sound views may be deduced respecting its treatment, and the limitation of its ravages.

The medical charge of the garrison of Fort Saint George, and of the general hospital of the Madras Presidency for a period

of five years (from 1819 to 1823), during which period the spasmodic cholera raged with great violence, gave the Author ample opportunities of observing this malady in all its forms, of treating it, and of making those examinations after death, which should never be omitted where any doubt exists of the real nature of a disease.

Respecting the cases which are detailed in this part of the work, the Author thinks it necessary to remark, in explanation of a seeming incongruity existing between the treatment of a few of them and the principles he has advocated, that these particular cases were treated in the hospital of which he had charge, by well-qualified and very meritorious medical officers, to whom he committed the care of them; that he was desirous of knowing the result of a method of cure, in behalf of which much might, perhaps, be adduced; and that he was desirous that rational views should not be placed under any restraint which might savour of narrow-mindedness.

The result of his observations respecting this formidable disease, the Author now offers with deference to the Profession, and

only laments his inability to do more justice to the subject.

His only object has been, to give an unadorned statement of facts exclusively; he trusts, therefore, to the indulgence of the Profession, and assures them that they have been derived from close and attentive observation at the bed-side of the patient, made in the daily, and he may say hourly, performance of his duty. If he shall be so far fortunate as to succeed, even in the slightest degree, in throwing an additional light upon this interesting subject, he will feel amply rewarded for the trouble he may have taken, and the anxiety which necessarily arises in the mind of one unaccustomed to give his opinions to the public. But in attempting this, he is endeavouring to discharge a duty which he owes to the service to which he belongs, and which it has a right to expect from him, as a return for the opportunities he has enjoyed.

As to the Reports, which constitute the second part of the work, he may merely state, that they were undertaken with a view of informing the medical officer, upon his arrival in India, of the climate of the

particular stations and districts in which his services may be required, and of the plan of treatment the Author has found most successful in combating the diseases therein prevailing. He publishes these Reports with a view of turning professional attention to communications of a similar nature; and he thinks it right to inform his readers, that the practical remarks accompanying them are the result of twenty-five years of active service in India. During this time, he has practised in all the districts and stations embraced by these Reports, and had very extensive experience in the diseases noticed in each of them, whilst successively filling the offices of regimental, staff, and superintending surgeon, — whilst performing the duties of extensive field hospitals, both European and native,—and, during the last five years, whilst in charge of the general hospital at the Madras Presidency.

With regard to the third part of this volume, the Author wishes that it may be considered as supplemental to the Reports, as it more fully developes the treatment of the prevailing diseases embraced by them, and as it refers to a remedy more generally

employed in the disorders of India than any other, and is, consequently, one to which more attention is directed.

Having had sufficient reason to believe, from the opposing opinions generally entertained respecting the operation and mode of exhibiting this remedy, that its influence in disease is not always justly appreciated, and that erroneous views are frequently entertained regarding its action, he was led by these circumstances to direct his attention to the subject. Considering that the method of administering this remedy which he adopted is authorised by extensive experience of its effects, and by as accurate observation as his abilities allowed him to make, he is induced to place before his professional brethren the results, whence they may draw their own conclusions.

If the reader shall consider that particular facts or opinions are too strenuously insisted upon, or that others are oftener referred to than necessary, the Author begs him to consider, that the subjects treated of in the second and third parts of the work, rendered this, and even some degree of repetition, entirely unavoidable; and expects

that he will be pardoned for whatever faults may have proceeded from his desire to impress upon the mind of the inexperienced practitioner in India, what a long residence, and extensive opportunities of observation, have fully convinced him of the importance of.

Assured that the Author will be judged by his desire of proving serviceable in his vocation, he sends forth his volume to the Profession, desirous that his views and practice may be adopted only as far as a candid and unprejudiced experience may confirm their propriety.

PREFACE

TO THE

SECOND EDITION.

The Author has endeavoured to render the present edition worthy of the liberal and very favourable reception which the former edition received from the professional public. He has greatly enlarged his practical observations on the most prevalent diseases embraced by the Reports; and has added two Chapters, upon the symptoms and treatment of the more chronic diseases of the liver, and of abscess of this organ, to the last part of the work.

It was at one time the Author's wish to offer some remarks in reply to a few objections to some of his views respecting the pathology and treatment of the epidemic cholera; but as these objections had chiefly proceeded from persons but little experienced in the treatment of this disease, and as the

Author's opinions, and the success of the treatment recommended by him, had been fully confirmed by the most experienced practitioners, who had expressed their sentiments on this important subject,—he considered it better not to swell out this part of his work by entering upon the discussion of controversial topics, especially as such discussions were neither calculated to advance our knowledge, nor to instruct those for whom the work is chiefly intended.

London, Sept. 13, 1828.

PART I.

TREATISE

ON THE

EPIDEMIC CHOLERA OF INDIA.

TREATISE

ON THE

EPIDEMIC CHOLERA OF INDIA,

ETC. ETC.

CHAPTER I.

INTRODUCTORY REMARKS.

The medical practitioner who has witnessed the ravages of the cholera which has lately prevailed in an epidemic form throughout the Indian territories, is naturally led to propose to himself the following questions: — 1st, Is there any mention made in the Hindoo medical writings, or in the history of the countries which have been visited by the present destructive disease, of its prevalence in any by-gone age in a similar form? — 2d, Does the history of medical science furnish any account of the occurrence of cholera as an epidemic disease, either in India or in any other part of the globe?

As respects the first question, I can only state, that I have not been able to obtain any informa-

tion from those acquainted with the writings of the Hindoos, favouring the inference that cholera has prevailed in former ages as a wide-spreading epidemic. The disease, however, in its sporadic and less malignant form, seems to be noticed in the medical works of the Hindoos; but in a way that illustrates neither its pathology nor its treatment. Indeed, it could scarcely be expected that a disease essentially dependent upon the climate and intertropical position of the Indian territories should be overlooked by the native writers on the diseases of these countries. But, as far as I am able to judge from the exposition of those who are well acquainted with Hindoo literature, the account given by these writers, although evidently pointing to cholera in its sporadic form, or as it casually occurs in India, has no reference to the epidemic disease of which I am about to treat.

As regards the second question proposed, medical writings furnish little information, and the little for which we are indebted to them is neither very definite nor instructive, as regards the point at issue. That the sporadic form of cholera is a disease depending upon the climate of India, is a fact which ought not to be lost sight of in our speculations respecting its origin. It depends as much upon particular climates, upon the nature of particular localities, and upon certain states and changes of the atmosphere, as

dysentery, bilious fever, or hepatitis.* From this it must follow, that it will be found endemic in some districts, particularly at certain seasons of the year; and, owing to a combination of the particular atmospherical vicissitudes which are well known to give rise to the disease, with those causes which belong more immediately to the district or locality, it may assume many of the characters of an epidemic malady; but then, although assuming these characters, it will be found that it entirely depends upon the causes alluded to, namely, those which relate to the district in which it occurs, and the state of the atmosphere observed for some time previous to and during its occurrence; and that it will disappear with the disappearance of these causes, especially of the latter. But, as we shall see in the sequel, this distinctive character cannot be applied to the disease which has been for several years, and now is, ravaging India. It is different, in many respects, from the cholera morbus previously observed and described by authors; and it has not been a partial epidemic, similar to some which I shall immediately adduce, and which evidently depended upon the causes I

* The reader may, perhaps, doubt that hepatitis is dependent upon the circumstances now alluded to, and may consider its endemic character as questionable. The experienced intertropical practitioner will have no such doubts.—See some of the Reports in the Second Part of the present Work.

have just now alluded to; but it has been general throughout one half of Asia, and has had no relation to localities, or the atmospherical changes on which sporadic cholera is generally found to supervene, and sometimes to prevail to a great extent.*

Of the occurrence of cholera, or rather the prevalence of it, in consequence of the situation of the district in which it was observed, and of the additional and more efficient cause— the continuance or sudden change of known states of the atmosphere — several instances may be adduced,

* It may be necessary to state more explicitly the meaning which I attach to the word *epidemic*. The etymology of it merely indicates the general prevalence of any disease. In this sense, almost every disorder may be said to be capable of recurring in an epidemic form. I shall therefore, — and, I believe, conformably with the general acceptation of the word,—use it in a much more limited sense. I consider that a disease is truly epidemic when it attacks great numbers at the same time, and when its general prevalence cannot be altogether explained by the common and manifest causes of temperature and season of the year, &c. without recurring to a certain state of the atmosphere, the nature of which state is beyond our means of ascertaining, and which is independent of the known and palpable conditions of this fluid, as respects its temperature and state of moisture. In this sense, fevers of various kinds, small-pox, dysentery, the cholera of India, scarlet fever, measles, hooping-cough, erysipelas, are epidemic diseases. Dr. Samuel Johnson defines epidemic to be, 1st, "That which falls at once upon great numbers of people, as a plague;" 2d, "Generally prevailing; affecting great numbers; general, universal," &c.

both as regards India at all periods of the year, and as respects Europe at particular seasons.

Thus, Dr. Paisley* wrote from Madras, in 1774, " There can be no doubt that their (the troops') situation contributes to the frequency and violence of this dangerous disease, which is, as you have observed, a true cholera morbus, the same which they had at Trincomalee." He afterwards states that the disease is often " epidemic," especially amongst the blacks; but, from the context, he appears to have confounded endemic causes with epidemic influence, and consequently to have ascribed what was evidently the result of locality and the peculiarity of the season, to some occult epidemic constitution, of which we find no satisfactory proof.

The accounts respecting cholera, furnished at different times, from the date of Dr. Paisley's letter up to the year 1817, by individuals who have visited India, refer chiefly to the prevalence of the disease in particular districts, in consequence of the peculiarities of these districts, and principally of the atmospherical vicissitudes to which the occurrence of sporadic cholera is usually attributed.

M. Sonnerat, in the account of his travels in India between the years 1774 and 1781, mentions that cholera prevailed on the Coromandel coast,

* See Curtis's Diseases of India.

and, at one period more particularly, assumed an epidemic and more malignant character: but, in this instance, we find it expressly stated, that "some were attacked with the disease from having slept in the open air; others in consequence of eating cold rice with curds; but the greater part from having eaten after they had bathed and washed in cold water. This epidemical disorder happened during the northerly winds in December, January, and February; when they ceased, the malady disappeared."

Here we find a sufficient reason for the more than usual prevalence of cholera. Cold dry winds, occurring after a warm and moist state of the atmosphere, are the usual causes of the frequent occurrence of cholera in temperate climates; and in intertropical countries, where these causes are generally more efficient, both as respects the causes themselves and the predisposition of those subjected to their influence, they could not fail of producing effects of proportionate intensity.

The accounts given of cholera in Curtis's well-known work, and in Girdleston's Essay on the Spasmodic Affections of India, refer merely to a somewhat more than usual prevalence of the disease, during the years 1781 and 1782, owing to the seasons, state of the climate, and circumstances immediately connected with the individuals who were its subjects; but neither

in the work of Curtis, nor in Girdleston's Essay, is any evidence to be found that the disease assumed a true epidemic character, or that it arose from other than manifest causes.

The information furnished us respecting the cholera which prevailed during the year 1787, in Arcot and Vellore, shews, in an equally satisfactory manner, that it depended upon the state of the season. Mr. Thompson, who was deputed to inquire into the causes of the more than usual prevalence of cholera in the districts now mentioned, expressly states, that "this disease is exactly the same as prevailed at Trincomalee in the months of April and May 1782, when the season was very hot and chill, the winds blowing from the land, and reaching some leagues to sea. The weather here, at present, is the same as I experienced at Trincomalee."

If we look farther back than to the middle and end of the eighteenth century, we shall be equally unable to obtain satisfactory information as to the epidemic prevalence of cholera in India. Bontius, our earliest writer on the disorders of this country, although he makes particular mention of cholera, says nothing of its occurrence as an epidemic disease; and, indeed, the description he gives of it, though sufficiently accurate as respects the slighter cases of the disorder as it occurs sporadically, by no means applies to the very violent form of disease constituting the present epidemic.

From these considerations, and from others which might have been adduced, I think it may be inferred,—1st, That we have no proof of the prevalence of cholera in India as a wide-spreading epidemic in former times; and 2dly, That the accounts which have been given of the more than usual prevalence of cholera, in a particular district or country, or at particular seasons, evidently shew, that such prevalence of the disease was owing to the nature of the locality, of the seasons, of the more evident atmospherical vicissitudes, and of the circumstances of those who were seized with the disease; and that it was not independent of these causes, and apparently resulting from others of a more occult nature, which, in the present imperfect state of our knowledge of the matter, have been denominated epidemic causes, or epidemic constitutions of the atmosphere.

But if it be denied that we have any knowledge of the previous existence of cholera as an epidemic disease in India, it may be asked if we are equally destitute of information as to its epidemic occurrence in any other part of the globe, during former times. On this point I shall briefly state the result of my inquiries. Sydenham informs us that cholera, "anno 1669, se latiùs diffuderat quàm alio quovis anno quantùm ego observaveram, eam anni partem, quæ æstatem fugientem, atque autumnum imminentem complectitur, unicè ac eâdem prorsùs fide, quâ

veris primordia hirundines, aut insequentis tempestatis fervorem cuculus, amare consuevit." And in another place he states—"exeunte æstate [anni 1676] *cholera morbus* epidemicè jam sæviebat, et insueto tempestatis calore evectus atrociora convulsionum symptomata, eaque, diuturniora, secum trahebat."* But these expressions, when duly weighed and considered in connexion with the context, shew merely, that cholera morbus prevailed more generally than it had been observed usually to have done, owing to the more manifest causes from which the disease arises having existed, at those periods, in greater force than usual. A few years' experience in London, or, indeed, in any district of country, is sufficient to shew, that cholera prevails more generally during the summer and autumn of one year than of another, owing to the difference in the character of the seasons; yet, although it may be said to be epidemic in these years of its more than usual prevalence, in one sense of the word,—viewing the word epidemic with reference to its etymology,—it cannot be considered as being truly epidemic, when the general relations and circumstances of the disease are more fully and generally investigated.

What has now been remarked, with respect to the observations made by Sydenham, is equally

* Opera Universa. Lugd. 1726, pp. 171 et 295.

applicable to the very scanty information we possess respecting the more than usual prevalence of cholera at more recent periods, in a few parts of Europe. J. Franck records, in the Ephemerides of Natural Curiosities, that a disease resembling cholera morbus was prevalent in Ulm during October 1696; but, although the history of this particular disease has been adduced by some recent writers as appertaining to cholera, it appears to me, on referring to the account given of it by Franck, to have been essentially distinct from the latter malady; and to have been an instance of the unusual prevalence of colic, which, in many respects, assumed the form of the painters' colic. The following particulars are sufficient to mark the difference between it and cholera morbus:—The disease appeared after the prevalence of cold and rain; it was attended by constipation, a lancinating pain in the abdomen, and spasms of the loins; and it attacked chiefly those who were addicted to the use of spirituous liquors, &c. Franck was at a loss whether to attribute it to the use of new wine made from unripe grapes, and to the variable state of the atmosphere, or to some inexplicable influence which emanated from the bosom of the earth.

From the time of Franck, medical authors have made very little mention of the unusual prevalence of cholera; and from that little, it

appears that they have confounded it with colic, which actually seems to have been the more prevalent disease of the two. Thus Augustini, in his account of the diseases predominant in Venice during 1747; Malouin, in his history of the colic prevalent in Paris in July 1750; and Lentin, in his Memorabilia Epidemicorum, describe a violent form of colic, but certainly not a true cholera morbus. Each of the descriptions furnished by these authors refers particularly to the existence of obstinate constipation and to occasional vomiting only.

I shall not pursue this subject farther, but conclude with the inferences, that we have no satisfactory proof of the previous existence of a disease in all respects the same as that which has recently ravaged India; that this malady is in many respects different from the cholera morbus of Europe, and, in a few, from the sporadic cholera of India; and, finally, that the cholera morbus of Europe more certainly, and the common cholera of India, as far as we have the means of judging furnished us, have never assumed features which resemble, in every particular, those possessed by this epidemic.

CHAPTER II.

OF THE SYMPTOMS AND PROGRESS OF THE EPIDEMIC CHOLERA.

Although this disease presents the general characteristic of all epidemics, yet it differs from the majority of them in several subordinate features, which will appear in the sequel, but more particularly in the rapidity with which it runs its course; thus putting at defiance all human means of checking its progress. It first made its appearance in Bengal in 1817, and was observed on the Madras side of the Indian Peninsula, at first at Jaulnah in June 1818; and it afterwards continued, without intermission, to spread through all parts of the country until 1821, when its force became considerably diminished. Even up to the present time, cases of the disease occasionally occur, but these are generally milder and more manageable than they were at the commencement, and during the height of its epidemic prevalence.

In order that the symptoms and the progress of the disease may be fully and distinctly brought before the reader, and in order that the Indian practitioner may have his attention more particularly directed to those changes which indicate

the commencing invasion of this dreadful malady, I shall direct his attention—*first*, to the description of its usual progress; *secondly*, to its early symptoms; *thirdly*, to the symptoms of the advanced stage of the disease; and, *fourthly*, to its Pathognomonic and Prognostic symptoms.

SECTION I.

Description of the Symptoms of Epidemic Cholera.

The progress of the disease is generally as follows: the patient feels, for several hours, or for a greater or shorter period, according to circumstances, a sense of general uneasiness and anxiety about the epigastrium, with a feeling of heat in this situation. These symptoms increase more or less rapidly; and the countenance, which at first is merely expressive of uneasiness, soon becomes more and more anxious and distressed. The pulse, at this time, is generally quickened, and always oppressed. This state of the system forms the first stage of the disease—a stage which, from its importance in the treatment of the disease, I have called the stage of invasion, and considered more at large in the next section.

Accompanying these symptoms sometimes, but always supervening immediately to them, the patient complains of sickness at his stomach,

and an uneasy sensation which seems to invade the whole track of the digestive tube. To this sense of general disorder, and of derangement more particularly of the alimentary canal, soon succeed a copious evacuation of the stomach and intestines, a sense of exhaustion, of sinking and emptiness, and an irregular spasmodic contraction of the muscles of the lower and upper extremities. The evacuations which take place at this time consist, in a great part, of the matters remaining in the stomach and the rest of the alimentary canal at the period when the patient was seized with the disease; and, from the abundance of these evacuations, and the sense of emptiness and exhaustion produced by them, it seems as if the contents of the whole tube were completely discharged at this time.

The spasms, which generally come on at this period, soon increase; but, although they are tolerably general, especially in the extremities where they commence, they seldom attack the muscles of the back, loins, and face: the abdominal muscles are affected next in succession to the extremities, and lastly the thoracic muscles and diaphragm. In respect of the nature of the spasms, it appears to me that they partake more of the clonic than of the tonic character; but the kind of spasm varies very much, even in the same patient, in different stages of the disease; in some cases it presents more of the tonic

character at the commencement, but gradually assumes the clonic form, which, upon the whole, seems to be the predominating kind.

With the supervention of spasm, and the evacuation of the alimentary canal, deafness, giddiness, noise in the ears, coldness of the extremities and surface of the body, are also present. Great oppression and anxiety at the præcordia and epigastrium are now generally felt, attended by difficulty and irregularity of breathing, and general collapse of the system. The pains sometimes felt in the abdomen are of a colicky nature, and often violent; but these, as well as the pain accompanying the spasms of the muscles of the abdomen and of the extremities, are relieved by pressure and friction. The skin becomes colder and colder as the disease advances, and is covered with a cold damp, which increases to a copious, cold, raw moisture, which bedews the shrunk, sodden, and cold integuments, especially of the extremities. The countenance now assumes a contracted or collapsed, cadaverous, and anxious appearance. The eyes are sunk in their sockets, and are surrounded by a livid circle. The pulse becomes first small, quick, oppressed; and afterwards, it scarcely can be felt at the wrist. Blood taken at this period is quite black, thick, and oily; and it frequently will not flow from the vein. The arterial blood also presents the characters of that

usually circulating in the veins. The patient all the while complains of a burning sensation about the epigastrium and umbilicus, and of an unquenchable thirst. The tongue and mouth are, however, moist, cold, and white. The vomitings and stools are now frequent, and consist entirely of a fluid resembling rice-water, with mucous flocculi and albuminous matter floating in it. Sometimes these matters are muddy, turbid, and somewhat different in colour; but they are always without any admixture of bile. As the disease advances, these evacuations become less and less frequent, and sometimes subside altogether for a considerable time before the death of the patient. The same may be said with respect to the spasms. The urine seems not to be secreted; and not only it, but even the saliva, and all the glandular secretions, appear to be completely arrested during the continuance of this dreadful malady.

As the disorder advances, the eyes and other features become more sunk, and the corneæ assume a flaccid appearance. The extremities are perfectly cold, covered with a cold, clammy moisture, and their surfaces sodden and corrugated. The voice becomes feeble, sepulchral, and unnatural; the respiration more and more oppressed, generally quick, and sometimes slow; and the air which the patient expires is cold. During this state, restlessness is generally ob-

servable, and is sometimes very urgent; the patient tosses about continually, and evinces the utmost distress. Although he is listless, impatient of disturbance, averse from speaking, and is altogether physically overwhelmed, still he retains his mental faculties to the last hour of his existence.

Towards the fatal termination of the disease, the sense of anxiety and oppression at the præcordia and epigastrium increases. The restlessness appears to degenerate into a kind of jactitation; the vital actions gradually sink, and at last entirely disappear; and the patient dies, generally, within twelve, fifteen, twenty, or twenty-six hours from the invasion of the disease.

Such is the description of the progress of the epidemic cholera — a disease which can never be forgotten by the practitioner who has even once been called upon to counteract its effects; nor contemplated, whether in idea or in reality, without sentiments of the most anxious and painful nature.

I shall next proceed to notice those symptoms which mark the different periods of the disease, in order that more precision may be entertained respecting the employment of the means best suited to counteract its disposition to a fatal termination.

SECTION II.

Of the early Symptoms of the Epidemic Cholera, or the Symptoms of the Stage of Invasion.

It is a matter of the most serious importance, both as respects the reputation of the practitioner, and the lives of those who come under his care, that the symptoms denoting the invasion of the epidemic cholera be familiarly known to him. From these symptoms, I am fully convinced, that an experienced and an attentive observer may discover the approaching invasion of the disease; and, by having recourse to suitable treatment, may prevent it from assuming that degree of severity which it inevitably would assume if it were left uninterfered with even for a very few hours; and which would lead to a fatal termination in a great many instances, notwithstanding the employment of the best-adapted and most active means.

A practitioner possessed of true professional tact, will discover in the countenance of the patient the earliest changes which mark the approaching invasion of cholera. The features are expressive of something approaching a state of anxiety, although the patient himself may not be aware of his state, or even that he is at all ailing. If the medical attendant inquire how he

feels at this time, he generally answers, "Very well:" but if pressed upon the subject, he acknowledges that he experiences feelings which he cannot distinctly describe, though he feels neither pain nor sickness. His spirits are, however, low, and there is sometimes a clammy moisture on the skin; and the pulse, though occasionally full and strong, is evidently oppressed and labouring. It is not, however, that kind of pulse which will attract particular attention, unless we are upon the alert for this disease; but being prepared for such a visitation, it is impossible to mistake it; and bleeding at this moment may be, and indeed has been found to be, attended with the happiest consequences.

I could adduce many instances, wherein a close attention, paid with the express purpose of discovering and observing this stage of the disease, has led to the adoption of measures which have had the best effects, as respects both its subsequent severity and the recovery of the patient; but this is unnecessary: the necessity of closely watching for, and of paying unremitting attention to, this stage of the malady, being sufficiently obvious.

During this stage of the disease, I may farther add, that the patient feels considerable nausea, and has his bowels more freely moved than usual; but the stools then generally consist of such matters as have been lodged in the large intestines,

and consequently they present various appearances, according to the state of the digestive organs at the time of invasion. The patient, however, often complains of no actual pain, even on pressure made upon the abdomen, either in this or in the subsequent stage, but what is the result of the spasm in the latter. He feels chiefly a great degree of exhaustion, and inability to make the least exertion. Colicky pains are frequently felt in the belly: but they often pass off, or are relieved by pressure and the free evacuations which take place in this stage. The urine, in the period of invasion, is often in small quantity, and seldom voided. In this stage of the disease, and indeed through its whole progress in many cases, the abdomen is more than usually tumid, evidently from congestion of the viscera lodged in this cavity. This is sometimes remarked even in those cases where a sense of emptiness is complained of, after the repeated retchings and purgings. When the disease is fully formed, it seems as if the blood is almost altogether accumulated in the large venous trunks and viscera of the great cavities, occasioning the phenomena constituting the second or advanced stage of the disease.

The following extract of a letter, from an intelligent and zealous medical officer, bears so fully upon this subject, that I shall take the liberty of quoting it, as it shews, in the clearest

manner, the strong impression made upon his mind as to the advantages that arose to the men under his charge from closely and vigilantly watching this stage of the disease. Mr. Colledge,* surgeon of the Honourable Company's ship General Harris, writes to me in the following terms: — "From the kind manner in which you have received a part of the sick belonging to the ship General Harris, under your charge, into the Madras Hospital, perhaps a statement of the primary symptoms, or mode of attack of upwards of seventy cases, may not be altogether devoid of interest, as, in my opinion, they partake much of the nature of the epidemic which has prevailed in India, more or less, since the year 1817. I must acknowledge, however, that some of these cases wanted the usual characteristics of this disease; but if it be taken into consideration, that the early period of their application for medical aid, or what is termed amongst seamen, going to the doctor on a refusal to work, we shall not be at a loss for symptoms which obviously mark the disease, previously to the supervention of purging, vomiting, or spasms.

* As the symptoms of invasion of the cholera have been so very little insisted upon by those writers whose works on cholera I have had an opportunity of seeing, and even, I believe, altogether overlooked by most of them, I here insert the whole of Mr. Colledge's letter, in support of my observations; adding merely a few corrections, which by no means affect the general purport of his remarks.

" I am so thoroughly convinced that these symptoms are only secondary, that, were the following marks present, I should not hesitate to pronounce the case to be one of epidemic cholera.

" As the patient is approached, an appearance of overpowering lassitude is at once perceived, with a pallid, anxious, and sorrowful cast of countenance; and in more advanced stages the countenance is dejected and sunk. Here allow me to remark, that this peculiarity of countenance was so very obvious to every intelligent person, that many of the officers deserve my best thanks for bringing to my notice those who assumed this oppressed appearance.

" My object being merely to point out early symptoms, you will grant me the use of the patient's own words: —'I must knock off work; I feel unable to do more, but don't know what is the matter: I have only a little pain in the stomach, and rumbling in the guts.' These are the patient's own words. Sighing, peevishness, and uneasiness, accompanied these complaints: are not these symptoms of congestion, to a considerable degree, in some vital organ?

" July 4th, 1821, 10 o'clock, A.M. Robert Smy came in the manner above described; I purposely neglected him, but I kept an attentive eye upon him, often passing his birth, and asking him how he was, feeling confident that cholera would be the result. One experiment of this kind was quite enough, and it was a sufficient warn-

ing to my assistant and myself to attend to the early symptoms. The patient was saved, but with much difficulty. At eight o'clock, P.M. I was sent for, and found him vomiting, and affected with spasms. His pulse was feeble and his spirits low. He considered himself as having been neglected, and refused to take medicines. Nine hours had elapsed from the appearance of the premonitory symptoms, until purging, vomiting, and spasm appeared.

"George Smith, Henry Sankin, Robert Hart, John Miller, George M'Alpin,* were in similar cases; but they were allowed to go without treatment at this early stage of the disease, in consequence of their own obstinacy in refusing to submit to it. The appearance of the countenance and other symptoms, marking the early stage of the disease, were best shewn in the cases of Webber, Lindigreen, Anderson, and Fabin.* From the continuance of pain, and protracted disposition to a state of collapse, in each of these cases, I am warranted in concluding that an unfavourable termination would most probably have supervened, had I deferred the treatment until the more direct and diagnostic symptoms of the disease had manifested themselves.

"An extract from my journal will shew the

* The names of some of the patients who were landed and admitted into the Madras Hospital.

healthy state of the ship's company previous to the appearance of this dreadful malady; the rapidity of attack, violence of symptoms, and the success derived from copious bleeding, &c. 'Madras, June 27th. The Honourable Company's ship General Harris dropped anchor in these roads on the 20th current; her crew, consisting of 140 men, 198 Honourable Company's recruits, and sixty passengers, all in good health, and free from epidemic disease during the whole passage from England. This day (27th) cholera spasmodica attacked one of our seamen whilst in bed, and three other cases have occurred up to July 5th; one of which appeared under the aggravated form of collapse, and the patient died in ten hours. The disease is now raging violently throughout the ship's company, cases hourly coming before us, some of which have the well-marked symptoms of cholera; others, on their application, have neither purging nor vomiting, but they are marked by an anxious and depressed countenance, general lassitude, and inability to exertion; pain across the diaphragm, with sense of constriction about the thorax. A few complain of pain on deep inspiration, and of headach and vertigo. Pulse regular, but quickened or oppressed, and differing as the constitution is feeble or robust. Tongue furred, with a clamminess of the mouth, and insatiable desire for cold water; they finding nothing to be

relishing but this fluid. Skin cold and clammy. When blood was drawn under these circumstances, it was dark, and the patient then invariably vomited, expressed himself wonderfully relieved, and always recovered.'"

The sentiments contained in the above extract correspond so precisely with my own observation, and corroborate so fully the views on this topic which I had adopted, that I make no apology for having given them thus at length. The cases which Mr. Colledge particularly alludes to were all landed at Madras, and they all recovered. John Miller, after having been discharged from the hospital quite recovered, had a severe attack of dysentery, and was left at the general hospital when the ship sailed to China; but he regained his health perfectly.

The detailed cases are likewise to be found in the hospital journals for July 1821.*

* Since this treatise was ready for the press, I have had an opportunity of seeing the Report on the Epidemic Cholera, drawn up by Mr. William Scott, surgeon and secretary to the Medical Board at Madras. In that Report I find the following statement, which must either proceed from an imperfect experience of the disease, or from a deficient attention to its early stages.

"This most formidable disease," Mr. Scott states, "does not appear to be attended by any premonitory symptoms which can be regarded as being at all peculiar to it; on the contrary, we may safely assert, that it is of sudden invasion; for although a slight nausea, a laxity of the bowels, and a general feeling of

SECTION III.

Symptoms of the Second, or advanced Stage of the Epidemic Cholera.

The symptoms usually looked for, as marking the advanced stage of this disease, are vomiting and purging of a thin watery fluid, similar to rice-water, with white flocculent matter floating in it.

indisposition, are often found to precede cholera, yet these symptoms are evidently common to many acute diseases; and they are especially frequent in this climate, without being followed by any graver ailment. When such symptoms are found to precede cholera, they might with more truth be regarded as indicating merely a certain deranged state of the alimentary organs; a condition of the body which certainly predisposes a person to an attack of cholera."

I have adduced sufficient evidence that there are premonitory symptoms, and those of a pathognomonic kind. I should not have noticed this statement, but, proceeding from authority, it is calculated to mislead, if it be allowed to go uncontradicted. The sudden invasion, as it is called in this quotation, with slight nausea and laxity of the bowels, is, in fact, the approach of the disorder to the second stage—the transition of the symptoms of invasion into those of the perfectly formed disease, when it is approaching its height, and when the patients are more generally brought to receive medical aid. When the premonitory or invading symptoms are not understood, and particularly when they are not looked after, the medical attendant is quite unprepared to check the disease in its early progress, when it is most manageable.

Severe and painful cramps supervene in the legs, arms, and muscles of the abdomen, and in many cases become even more general. The eyes are sunk, and the features sharp and collapsed. The skin is generally cold, and covered with a clammy dew. There is scarcely any pulse at the wrist, and if it be at all perceptible, it is small and thready, and generally quick; but it sometimes conveys the idea of oppression. The extremities are cold, livid, and shrunk. Sometimes there is considerable heat about the chest and epigastrium, and the head is in general hot. The respiration is oppressed, interrupted, laborious, and frequent or irregular. The tongue is not particularly foul, though at times it is covered with a thin coat of glairy mucus; and at other times it is dry and white, having the appearance of being without blood; but it is not furred. The lips are cold and blue. The fluid stools are generally discharged from the bowels with a considerable degree of force, as if they were ejected from a syringe; but they are usually unaccompanied by any pain.

During this stage the patient voids no urine; and, judging from the phenomena of the disease, and the appearances observed on the dissection of fatal cases, I believe that the functions of the kidneys are entirely suspended; the watery part of the circulating fluid usually secreted by them being completely drained off by the diseased and

greatly increased action of the mucous surface of the digestive canal.

The appearance of the extremities is peculiar, particularly of the superior extremities: the hands and fingers are shrivelled, as if they had been soaking in warm water for a considerable time; the nails are blue, and sometimes there is a blue cast over the whole skin. The general prostration of strength becomes now excessive; and the thirst insatiable, evidently owing to the defect of the aqueous part of the blood, from the morbidly increased action of the digestive mucous surface, and the frequent retchings and watery stools. Accompanying this insatiable thirst, the patient generally complains of an inward heat, and of a burning sensation about the umbilicus.

These are the symptoms which are usually observed when patients are first brought for assistance, both in natives and Europeans; they differ only in degree, and are merely modified according to the activity of the exciting cause, and as the strength and vigour of the patient may have given rise to some degree of re-action, or efforts at re-action, of the vital energies of the system.

In this stage the spasms become more general; but the muscles of the back and of the face are uniformly exempt from them. Notwithstanding the urgency of the vomiting and purging, the patient often complains of little or

no pain on pressure being made upon the abdomen: indeed he frequently makes but little mention of any other painful sensation than of that of a colicky nature, and what accompanies the spasms, and of the burning sensation in the abdomen, to which I have already referred. In some cases, however, excruciating pain of the abdomen, stomach, and limbs, is complained of, and is aggravated by the recurring spasms and evacuations.

In respect of the appearance of the stools, and of the matters thrown off the stomach in this stage of the disease, I may remark that, when the bowels have not been fully emptied during the previous stage, the stools which are the first evacuated generally vary in appearance, according as the matters lodged in the intestines may modify their character; but they commonly assume the appearance of congee-water, with flocculent matter floating in them, or matter of a still more albuminous character. But almost in no case of the disease do we find, in this stage, any appearance of bile in the stools; nor is bile ever observed in them until the violence of the malady has received a check, and until it is allowed to flow into the duodenum, either from this circumstance and the spontaneous relaxation of the spasms of the duodenum and biliary ducts, or from the operation, upon these parts, and upon the liver itself, of the remedies employed.

As to the appearance of the matters thrown

from the stomach, it may be generally stated, that they consist, at first, of such ingesta as may have remained in this viscus at the time of attack, and that they are afterwards in every respect similar to the matters which come away from the bowels.* When the disease draws to a termination, the violence of the retching and purging often ceases; but still a watery, and sometimes an ichorous fluid, continues to flow from both the mouth and anus until the death of the patient.

* In Mr. Scott's Report on Epidemic Cholera, formerly alluded to, I observe the following statement:—

"Spasm may be generally present in one instance of invasion; in another it may not be distinguishable. A frequent variety, the worst of all, is that which is noted for the very slight commotion in the system, in which there is no vomiting, hardly any purging, perhaps only one or two loose stools, no perceptible spasm, no pain of any kind, a mortal coldness, with arrest of the circulation, comes on from the beginning, and the patient dies without a struggle."

This is a type of the disease which I have never seen. Deaths may take place in this manner and suddenly in the disease, and when no person can give information as to how long the patient had been complaining, or as to the nature of his complaints, before he was brought for medical aid; but in every case in which I had an opportunity of marking the progress of the disease, I have seldom found it to terminate in a shorter period than that of ten or twelve hours, or without much more marked symptoms than those referred to in this quotation. I have certainly seen patients die in the state described by Mr. Scott, and a great many have died in this manner; but in all these instances, the symptoms indicating a more violent commotion of the system have passed off, and the fatal collapse had supervened before they were brought for treatment.

Some writers upon this disease have endeavoured to point out distinct varieties or forms which it has assumed in different places and persons. Such diversity, in my opinion, is entirely owing to the activity of the exciting causes, to the habits and constitutions of the affected, and to various adventitious circumstances. But although they frequently modify the phenomena of the disease, their nature is not materially changed by them; and the malady, as far as my observation has extended, usually pursues the course now described. Several of the symptoms remarked by some of those who have given an account of the disease, and many of the peculiarities which they have enumerated as occasionally remarked, are rather to be imputed to fortuitous and concurrent circumstances conspiring with the causes of the disease, and to the remedies employed in the course of treatment, than to the pathognomonic phenomena constituting the malady.

SECTION IV.

Of the Pathognomonic, Diagnostic, and Prognostic Symptoms of Epidemic Cholera.

The symptom which I have always looked for as particularly marking this disease—and I have never seen a case of the epidemic wherein

it did not exist—was a burning sensation between the scrobiculus cordis and umbilicus, precisely over that spot where the vermilion blush was invariably found on examination after death.* This is one of the first symptoms the patient is sensible of, and it is generally felt before vomiting or purging takes place. Whenever this painful sensation is accompanied with an anxious look, and a general feeling of weakness or oppression, even without vomiting or purging, we may be certain that the disease is at hand; and at this stage it is generally manageable, if boldly and decidedly treated.

The vermilion blush over the small intestines—which blush exactly resembles the colour they assume when injected to shew the villi†—I conceive to be peculiar to this disease, and belonging to its pathological character, because it is the only appearance that is not observable in many other diseases: for instance, congestion of the brain is found in an equal degree in apoplexy; and in various visceral affections, we find occasionally congestion to a great extent in the liver, spleen, lungs, &c. &c.; but the peculiar vermilion appearance observed in cholera, I do not recollect to have seen, by any means so generally, in my examination of those who have

* See the Section on the details of cases illustrating the pathology of the disease.

† See the dissections in Chapter III. Sect. 1.

died of other diseases of the abdominal viscera. I am, however, fully aware that this appearance may sometimes be found in cases of sudden death; but I am anxious to draw attention to this particular symptom, and to connect it with this particular appearance of the small intestines, which appearance will always be found on examination after death. This symptom, therefore, I consider as particularly characteristic of the epidemic cholera; and this morbid appearance, which is related to it, I conceive to be the particular lesion which is uniformly to be met with on dissection of cases of the disease.

Cold skin, colliquative sweats, and collapsed countenance, are symptoms which I have frequently seen in cases where worms were the cause of disease; and which symptoms were completely removed on their discharge. But, in treating cholera, I have always been particularly careful to ascertain, in its early stage, whether the patient complained of a burning sensation about the umbilicus or not; and whether it was mild or otherwise: when this symptom was felt, and more particularly when it was attended with sighing and anxious respiration, I considered the case to be a well-marked one of epidemic cholera, and acted accordingly.

It is seldom, indeed, that patients are seen before all the symptoms are fully developed, and then the pulse at the wrist generally cannot be

felt. There is little to be expected from human art at this period of the disease; yet I have seen such cases recover frequently, but still I consider recovery to be quite a chance, and to be, perhaps, owing more to the constitutional strength of the patient than to the remedies employed, or to the knowledge and judgment of the practitioner. I am, however, quite satisfied that the disease will prove perfectly manageable if the treatment be commenced in its early stage, and before the symptoms of congestion have arrived at the utmost.

Diagnostic Symptoms.—There is no symptom of the disease more uniform than the black, thick, and ropy condition of the blood taken from a patient in the epidemic cholera, particularly when the disease is fully formed. This condition of the blood, of which the arterial blood also in some degree partakes, is, even of itself, and still more particularly when viewed in connexion with the other symptoms, sufficient to distinguish the disease from the cases of sporadic cholera formerly occurring in India, and from the cholera usually observed in warm climates, or in temperate ones during the autumnal season. The low and exhausted state of all the vital actions; the depression of the patient's spirits; the unnatural appearance, and cold, dewy condition of the surface of the body; the withered

and cold state of the extremities; the extension of the spasms, so early in the disease, to the muscles of the superior extremities and chest; the entire absence of bile from the stools and the matters vomited; the suppression or interruption put to the secretion of urine, and to all the other natural secretions; the early depression of the action of the heart and of the pulse; the coldness of the mouth, tongue, and respired air,—are phenomena which we find not similarly congregated in any other disease, and which are sufficient to distinguish it from the other species of spasmodic diseases in general, and from the bilious cholera, and even from the *mort de chien*, or more violent form of the cholera commonly observed in India, in particular.

The clonic nature of the spasms, the manner in which they attack the extremities and abdominal muscles, and their uniform absence from the muscles of the back, loins, and face, are circumstances sufficiently serving to distinguish epidemic cholera from tetanus and trismus.

The copious evacuation of the bowels and stomach, the state of the pulse and surface of the body, and the sensation felt, so early in the disease, at the epigastrium, serve to shew that it cannot be confounded with colic. As bile is seldom if ever met with in the severer cases of the common cholera of India until the violence of the disease is diminished, or medicines pro-

cure the flow of it into the intestines; and as the general phenomena of the disorder are so nearly allied,— it may be proper to allude, at this place, to the points of dissimilarity existing between it and the epidemic form of disease. But here I may also admit, that a number of the phenomena characterising both, differ chiefly in the greater malignity of those appertaining to the latter malady, and in the rapidity of their progress to a fatal termination. The absence of bile, however, from the matters voided in both forms of disease cannot be assumed as grounds of identity between them, more than the existence of spasm in both can be considered as such. In the latter form of malady, besides the more malignant nature of many of the phenomena common to both, we find that the dark and otherwise morbid state of the blood, the burning sensation complained of at the epigastrium, the low, weak, small, and undeveloped state of the pulse from the commencement of the attack, the cold tongue and mouth, the coldness of the respired air, the great derangement of the respiratory function, the shrivelled state of the extremities, the cerebral congestion, the clonic nature of the spasms, the suppression of the urine and other secretions, the wide diffusion of the disease throughout southern Asia, its violence and fatal effects,— are circumstances which authorise the inference, that the epidemic cholera is different from the common cholera

of India, as observed previous to 1817, not in degree alone, but that it is also different in kind. These circumstances cannot be explained by a reference to a mere difference of intensity in the causes immediately producing both forms of disease, but must be referred to the existence of some superadded cause, whose presence and extension have been as general as the epidemic disease which it has been mainly efficient in producing.

Prognostic Symptoms. — The symptoms by which the practitioner may with propriety be led to hope that the disease will terminate favourably, are, an increase of the strength and fulness of the pulse, a return of warmth to the extremities, and an increase of heat on the surface of the trunk; less frequent calls for drink, and a diminution of the burning sensation in the epigastric and umbilical regions; diminished urgency, or cessation of the spasms, vomiting, and purging; the appearance of bile in the motions, and an inclination to void the urine, and still more particularly, if any quantity be voided; an improvement of the countenance, and a return towards the healthy appearance and functions of the skin; a more natural respiration, and an increased warmth of the air which is expired by the patient; an inclination to tranquil sleep, or a more lively aspect of the eyes; a ruddier or

livelier appearance of the lips, tongue, and mouth; and less general uneasiness and restlessness.

If, on the contrary, the symptoms mentioned in the description of the disease increase rapidly, notwithstanding the means of relief which have been adopted, and the functions of respiration become either very unusually slow and oppressed, or very quick and laborious, as if the patient were gasping for breath; and if the action of the heart be so greatly diminished as not to occasion pulsation in the extremities; when the features are sunk and collapsed, and the tongue and mouth become cold, and the breath produces a cold and raw impression on the observer; and when the cornea begins to sink, and jactitation to be constant, the spasms, vomitings, and purging, at the same time to cease, we cannot hope for the recovery of the patient. The vital energy has then sunk so low, owing to the operation of the cause of disease, and to the more immediate effects produced thereby upon the nervous system, and upon the blood through the medium of the lungs, that it seems beyond the influence of medicine to restore it.

CHAPTER III.

ON THE PATHOLOGY OF EPIDEMIC CHOLERA.

Before I proceed to consider the causes of the disease, I will first detail the history of some of the cases which came under my care, and the appearances which were observed upon a *post-mortem* examination of them. I am induced to adopt this arrangement, because these cases not only illustrate the description I have now given of the disorder, but they furnish, in addition to what I remarked in other cases which came before me, the data on which I rest some observations respecting its pathology. These cases will also be found to convey much useful information, which may be made available when I come to speak of the *causes* and *treatment* of the epidemic cholera; and the details of these cases will not, it is hoped, appear the less interesting, that they enable the pathologist to trace the relation which he may consider to have existed between the signs of disease observed during the life of the patient, and the lesions remarked after death had taken place.

SECTION I.

Details of Cases illustrative of the Pathology of the Disease.

I HAD no opportunity of treating the epidemic cholera in 1818, the year when it first appeared at Madras; but in 1819, on taking charge of the general hospital at this presidency, opportunities of doing so were ample. Having formed no notion of the nature of this disease till my own observations enabled me, I entered upon the treatment of it perfectly unbiassed in opinion. The following cases were the first that came under my charge; and as they furnished the grounds on which I formed my ideas respecting the nature of the disease, and of the treatment which I considered the most suitable to it, I shall proceed to detail them faithfully to the reader, and as they stand in the journals of the hospital.

CASE I.

JAMES LYNCH, private H. M. 84th regiment, aged 30 years, a strong, healthy man, seldom in the sick report, but much given to the drinking of spirits. The party of the regiment to which this man belonged was encamped upon the south beach, ready for embarkation to Europe. Strong southerly winds were at this time blowing, and the men, owing to their situation, were exposed to cold

blasts and clouds of sand. It appeared that Lynch had taken a hearty dinner at two o'clock, P.M. on the 23d May, 1819. That about three o'clock the same afternoon, he accompanied some of his companions to bathe in the surf close to the tents. While in the water, he was attacked with sickness at the stomach, and he vomited a quantity of green, bitter matter. This was almost immediately followed by a violent purging; and the stomach and bowels from this time were emptied alternately, till their natural contents were completely removed, after which, the discharges from both became watery. In this state he was brought to the general hospital, between the hours of six and seven o'clock, P.M. accompanied by Dr. Walker, surgeon of H. M. 73d regiment, who had been appointed to the medical charge of that division of the 84th regiment which was about to embark for Europe.

I am unacquainted with what had been done for this man previous to his admission into the general hospital, nor did I see him on his arrival, having been at the time engaged with a very difficult case of midwifery; but Dr. Walker, and Mr. Conwell, who was also present, gave stimulants with opium, used friction, applied warm bricks to the extremities, and opened three veins in the arm. When I saw him there was no pulse at the wrist; he was covered with a profuse, cold, clammy dew; the nails were blue; fingers and palms of the hand shrivelled; eyes sunk deep in the orbits, and the features collapsed and sharp; thirst excessive, the patient continually calling for cold water; breathing exceedingly oppressed and difficult; no heat about any part of the body, except the chest, which was considerably above the natural temperature; tongue white, and covered with a clammy mucus. Spasms in the extremities and body

extremely distressing. Blood could not be procured from the arm; the little which oozed out was thick, black, and ropy.

Warm, stimulating applications were applied to the extremities and body; the patient was put into a warm-bath, brandy and water were given him to drink, which he took with avidity, and after he was removed from the bath, he was well dried in warm cumlies;* a stimulating injection was given, and sinapisms were applied to the legs. About forty minutes past seven o'clock his breathing became short, quick, and laborious; and he died about eight o'clock, P.M. five hours from the first attack.

Examination of the Body.

On laying open the abdomen, the arch of the colon was found considerably contracted; the stomach greatly distended, and completely covering the liver, leaving a very small portion visible, which was of a pale brown colour. The omentum was very fat, and covered the whole of the small intestines.

Intestines.—After the removal of the omentum, the small intestines exhibited a very singular and unusual appearance: their coats were much thickened, and they had a doughy feel, as if filled with pultaceous matter. The duodenum and jejunum were of a pale vermilion colour; the ileum was of a darker hue, and its calibre much contracted. About two feet of this intestine, near its entrance into the cæcum, had a dark blue colour, and the veins upon its surface were beautifully injected.

The small intestines were laid open throughout their

* An Indian blanket.

course; their coats were generally much thickened, and they contained a quantity of thick, viscid, and tenacious matter, of a yellowish cream colour. It is remarkable that, although there were considerable congestion and vascularity in the external coat of the small intestines, there was not the least appearance of congestion or vascularity in the internal surface of either the duodenum or jejunum; but upon that part of the ileum which I have already noticed as having a dark blue cast, the mucous coat was quite purple, and we distinctly traced this to be owing to the venous congestion.

The external coat of the colon had the same colour which I have already described; and on laying that gut open from the cæcum to the rectum, I could not observe any change of structure: but from the commencement of the transverse arch to the rectum, the whole internal coat was of a dark red colour, which increased in brilliancy as it approached the rectum. No fæces were found in the intestinal canal.

Stomach.—The stomach was next examined and laid open. Near the pyloric orifice it was much corrugated, of a dirty and darker colour than natural, with some bruised bloody spots between the coats. The pylorus had a bright red, gelatinous appearance, compared with the part above described.

Liver. — The liver was not enlarged, but the superior convex part of the right lobe was of a purple and mottled hue; and the inferior concave surface of the same lobe was of a dark blue colour; this part, on being cut into, emitted *thick, black-coloured blood* freely.

The gall-bladder contained about three ounces of bile, of a dark green colour, but not so thick as I have sometimes seen it. There appeared to me to be a stricture of the mouth of the common duct, which prevented the bile

from passing without very considerable pressure upon the gall-bladder; but after this stricture was once forced, the bile then flowed with ease.

Lungs.—I found some adhesions between the lungs and the pleura costalis, and the vessels filled with blood; but the whole posterior portion of the lungs presented precisely the appearance of a solid mass of bruised, bloody flesh; and when cut into, had a flesh-like structure; it gave out profusely, a *black, thick blood,* and seemed to have completely lost the character and structure of lung.

Heart.—Very little water in the pericardium, but the blood-vessels were turgid. The heart itself was collapsed, particularly the right ventricle, and contained no blood.

Head.—The dura mater was transparent, and the vessels were in a very turgid condition.

Between the tunica arachnoides and the pia mater, on the middle lobe of the right hemisphere, I observed a considerable effusion of dark-coloured, gelatinous, bloody lymph, as if a severe blow had been inflicted on that part; and on the left side also the same appearance existed in a less degree. The vessels of the pia mater were very turgid, and of a darker colour than I have ever seen them before. The appearances, generally, were precisely the same as are found in some apoplectic subjects.

On removing the pia mater, the brain was found soft and pulpy. There was very little water in the lateral ventricles. The vessels of the choroid plexus were very turgid, giving it a dark reddish-brown appearance, very different from its natural and healthy state. The vessels of the cerebellum were precisely in the same state of congestion as those I have already described; the pons

varolii and medulla oblongata were likewise highly injected; and a small quantity of water was found lying in the cerebellic cavity and top of the spine.

CASE II.

Chowery Mooto, Sepoy, 2d br. sixth regiment N. infantry, a strong, healthy man, about forty-three years of age, who had lost his leg at the battle of Mahidpoor, 21st Dec. 1817. He was perfectly well, to all appearance, at seven o'clock in the morning of the 25th May, 1819, when I was going my rounds through the general hospital. At ten o'clock he was reported as having been attacked with vomiting and purging; I went to him immediately, and found a wonderful change in his general aspect; his features were sharp and shrunk; pulse scarcely perceptible, small, thin, and struggling; skin cold, and covered with clammy dew; burning sensation above the navel; countenance expressive of great anxiety and distress, but not of a feeling of actual pain. When I inquired where he felt pain, he drew his finger round the navel, and said, "Here." As the Medical Board at Madras had recommended the application of nitric acid, as a quick and effectual blister in these cases, the umbilicus, scrobiculus cordis, and chest, were well rubbed over with the following:—

℞ Acid. Nitr. fort. ʒiij.
Aq. puræ ℥jss. M.

It produced considerable smarting, but no blistering; a large mustard cataplasm, mixed with vinegar, was therefore laid over the whole abdomen, and the following draught given:—

℞ Sp. Ætheris Sulph. ʒj.
Opii ℳl.
Aq. Cinnam. ℥j.
Aq. puræ ℥j. M. ft. haust.

Warm frictions and hot bricks were applied to his exremities.

Eleven o'clock, A.M. — Passed a large evacuation of yellow fluid, unmixed with fæces, and which I considered at the time to be pure hepatic bile. He retained the draught upon the stomach, but the pulse could not be felt at the wrist, and the whole surface of the body was covered with a clammy, cold dew. Thirst very urgent; spasms extending from the hip to the foot, and extremely distressing.

Warm brandy and water was given to him occasionally, but in small quantities at a time. The vapour-bath was used, and friction, with spirits of turpentine, applied to the extremities, with evident relief of the spasms: and as the thirst was most distressing, a person was constantly at his side supplying his wants, but preventing his taking too much at one time, lest it should make him sick.

He was sensible of the heat of the vapour-bath, and moved about a good deal while it was in use; but it appeared to me rather to distress than relieve him, and it made no alteration whatever in the temperature of the skin.

At *twelve o'clock* he became perfectly indifferent to external objects, would not speak, but made signs that he was easier. No warmth could be produced on the skin, either by friction or the vapour-bath. The surface was still covered with a cold, clammy dew, and his eyes were

much sunk in their orbits and drawn upwards, so that the white of the eye could alone be seen. He made no complaint; but the anxiety expressed in his countenance was distressing. No pulsation was felt at the heart or wrist, and he breathed with great difficulty.

The draught was repeated, and an anodyne injection was given. The former remained on his stomach, but the latter was immediately returned. He called anxiously for rice-water with brandy, which was given to him; and the spirituous frictions and vapour-bath were continued.

At *one o'clock* the skin still continued cold, and he seemed not so sensible to heat as he formerly was. He made a slight effort to vomit, but did not throw any thing off his stomach. He was quite indifferent to every thing around him, and disliked being questioned. There appeared, at this visit, to be some uneasiness and confusion in his head, for which a few leeches were applied to the temples. As they would not bite, a vein was opened in the arm, but no blood followed the operation. In this state he continued till three o'clock, P. M. when he fancied himself much better, and called for mullagatawney. I could not see any favourable change, and he died before the pepper-water could be prepared, about five hours from the period of attack.

Examination after Death.

ABDOMEN.— *Small Intestines.* —After removing the parietes of the abdomen, the jejunum appeared much inflated, rising considerably above the other intestines, and throwing back the omentum and colon, so as to leave itself completely uncovered. There was much congestion

in this intestine, and several spots of a dark red and bruised-like appearance. Near the commencement of the ileum it had a thickened feel, and was of a dark vermilion colour, which extended some distance along the ileum; but the lower part of this latter intestine, on being removed from the pelvis, exhibited a more natural state of its coats, with less of the pulpy matter than was found in the upper part of the canal; but it was of the same hue as described above, only of a lighter vermilion, or flesh colour.

The duodenum was laid open, with a view to examine the biliary ducts. The mouth of the ductus communis choledochus was sufficiently open to admit the point of a probe; but the bile did not flow from the gall-bladder until considerable pressure was made upon it. The whole of the small intestines was removed, and laid open from the duodenum to the cæcum. In the duodenum and jejunum there was, both externally and internally, considerable congestion, which appeared to exist in the cellular substance connecting the muscular and mucous coats. Blue and red-coloured spots were observed in various parts of these intestines, corresponding precisely with the place where the patient complained most of pain when attacked with the disease.

There was not much congestion in the ileum, but a dusky vermilion blush pervaded the whole of that gut, similar to the external appearance of the gut when injected to shew the villi.

Colon.—The colon was partially contracted throughout its course; and on laying it open, there was not observed the slightest appearance of congestion, either on the external or internal surface.

Stomach.—The *stomach* was distended by a watery

fluid. The general appearance of the peritoneal coat was natural; but on the internal surface there was considerable congestion, particularly about the cardia and large curvature; and this congestion appeared, evidently, to be confined to the vessels of the cellular tissue, connecting the muscular with the mucous coats.

Liver.—The liver was not much enlarged, but it was in a high state of congestion, of a dark blue colour, and it bled freely when cut into. The gall-bladder was not unusually full of bile, and what was found there was healthy.

Lungs.—The lungs were much collapsed, of a very dark colour. Both lobes were like a mass of bruised flesh, and when cut into had a fleshy structure, and poured out, very profusely, thick black blood.

Heart.—The right auricle and ventricle were full of blood, and both the vena cava superior and inferior, were gorged with the same fluid. A small quantity of black blood was found in the left auricle and ventricle.

Head.—The dura mater was transparent, and the meningeal arteries and veins exceedingly turgid, both in their trunks and branches. On separating and removing the dura mater, about six ounces of serum were found between that membrane and the tunica arachnoides.

The anterior portion of both hemispheres of the cerebrum had the appearance of having been the seat of considerable arterial action; the arterial branches were highly injected with red blood; and the large veins spread over the posterior portion of the cerebrum were gorged with black blood. Upon the middle lobe of both right and left hemispheres there was a red gelatinous extravasation, as if some injury had been sustained in that situation.

The vessels of the pia mater in general were exceedingly turgid, and infinitely more dense than in a healthy state, uniting the hemispheres so firmly as to require some force to separate them, to expose the corpus callosum. Very little water was found in the lateral ventricles, and the choroid plexus, though very turgid, still retained its beautiful appearance. Some effusion was found in the cerebellic cavity and top of the spine, and a very great turgescence of the vessels surrounding the whole of the cerebellum, the pons varolii, the medulla oblongata, and all the nerves which rise there.

CASE III.

James D'Arcey, private H. M. 84th regiment, aged thirty-six years, was attacked in the tents on the south beach, about twelve o'clock at night, 27th May, 1819, with purging and vomiting, and pain in the belly and side. Dr. Walker, who was upon the spot, gave him the following draught:—

℞ Tinct. Opii,
Tinct. Valerianæ, āā ♏ l.
Aquæ puræ ℥j. M. ft. haustus.

And in half an hour afterwards, the same quantity of tinct. opii, and ninety drops of tinct. valerianæ, were repeated; a vein was opened, but no blood would flow. At *one o'clock*, A.M. the patient took several drops more of tinct. opii, being in all 170 drops, and was sent to the general hospital, where he arrived at a quarter past two o'clock, on the 28th of May.

Quarter past two o'clock.—Has just now had one evacuation from his bowels, of a watery consistence, and

brown muddy colour; does not complain of sickness, but says he has a severe pain in his side. The skin is quite cold, and is covered with a clammy dew; his hands and feet are pale, bloodless, black, and wrinkled, and as if they had been soaking in water for some time. No pulse at the wrist, nor in the temporal artery; feels no pain in his head, but says there is a noise in his ears and head, like the roaring of the surf. This, however, he did not express till I inquired whether he had pain: I therefore conclude it does not distress him.

The medicated vapour-bath was immediately used, and appeared to act extremely well. It produced considerable heat over the body, but it did not, in the most remote degree, change the nature of the perspiration, which still continued to be a deadly cold, greasy moisture. The following draught was given:—

℞ Tinct. Opii,
Sp. Ætheris Sulph. āā ʒj.
Mist. Camph. ℥jss. Ft. haustus.

Warm brandy and water was given frequently, and he took it with great satisfaction; I opened a vein in the arm, but only a few drops of black, sizy blood came away; leeches were applied to the base of the head, and to his side, where he complained of pain; but only two would fasten upon him. I could not trace the jugular vein, or I should have opened it. The scarificator was used, with the intention of cupping; but there was not a drop of blood on the surface, and no pulsation any where but in the carotid artery.

At *half-past two o'clock* the draught was repeated, and congeé-water with brandy was given. The extremities were well rubbed with spirituous embrocations.

Three o'clock.—He has retained every thing he has taken upon his stomach; has had two watery motions. He feels at present cramps in his legs. Let the legs be well rubbed with sp. terebinth. This was attended with the best effects—with a complete cessation of spasms; but he says, "the pain in his side is shifting higher up towards the chest," and his breathing has become oppressed and difficult.

The nitric acid blister was applied over the epigastric region, and at half-past three it was repeated, but with very little effect. It appears to me to do no more than to make the patient smart, without producing any thing like vesication. He says he suffers no very acute pain, and only feels weak. The spasms are not severe in any part; but his breathing bespeaks great distress and oppression. He is desirous, however, of having something to eat. Give him arrow-root and brandy, in preference to wine. The pain in his left side increases, and he says it is gradually rising upwards to the lungs. Repeat the vapour-bath.

Thirty-five minutes past three o'clock.—Complains, for the first time, of pain about the heart. The pulsations of the carotid artery are 120 in a minute, but becoming very languid.

Fifty minutes past three.—Pain on the left side very severe. Neither of the nitrous applications has yet had any effect upon the skin. Let the nitrous blister be repeated, of the following strength:—

℞ Acid. Nitric. fort. ʒj.
Aquæ puræ ʒss. M.

This produced great smarting, much worse, he says, than a blister. Breathing more oppressed, and very

laborious; excessive restlessness. The two leeches which fastened on the side have fallen off, but not one drop of blood has flowed from their bites. He has no spasms, but is evidently sinking; his skin is quite cold, yet his mind appears collected: he asks for arrow-root and brandy, which are given to him.

Five minutes past four.—Takes thirty-eight inspirations in a minute; says he feels quite easy, though he is evidently very much oppressed.

Repeat the draught and the vapour-bath.

Half-past four.—Still complains of a noise in his ears, like the roaring of the surf, and says he begins to feel distress and oppression about his head. He continued in this state, without any visible change, till a quarter past five o'clock, when he became quite insensible. He died about six o'clock, A. M. four hours after his admission, and six from the time of attack.

He appeared to suffer more during the last ten minutes of his life than at any time from his first coming into the hospital.

Examination post Mortem. — The appearances were precisely similar to those I have already described in the cases of Lynch and Mooto, with this exception, that there was not so much congestion in the liver of D'Arcey as in the former cases; but the right side of the heart, the large veins leading to it, and the pulmonary arteries, were all completely gorged with blood. The left auricle and ventricle were much contracted, and contained but a very small quantity of blood, and that was of a very dark colour. The state of the brain was likewise similar to what was observed in the former cases.

CASE IV.

Serjeant Henry Halding, H. M. 84th regiment, was taken ill in Fort St. George, about ten o'clock, A. M. and went to the garrison assistant-surgeon, who gave him two draughts, which were rejected immediately. He was sent to the general hospital at three o'clock, P. M. on the 28th May, 1819, five hours after he had been attacked.

When he arrived at the hospital the pulse was quite gone at the wrist, his skin was quite cold, and without perspiration. Complained of pain in his head, and immediately under the ensiform cartilage, but not until inquiry was made as to these symptoms. Eyes clear and natural. Spasms of his extremities very distressing. He is purged frequently; the stools are quite watery, and not discoloured; tongue white, dry, and excited.

Two veins were immediately opened in both arms, and about eight ounces of blood were drawn; but it was thick, black, and sizy, and oosed out in drops. He thinks the pain in his head is relieved, but the cramps are as bad as ever. Let the medicated vapour-bath be used, and the following draught be taken immediately:—

℞ Sp. Æther. Sulph.
Tinct. Opii, āā ʒj.
Mist. Camph. ℥jss. M. ft. haustus.

Let the extremities be well rubbed with sp. terebinthinæ, and give him warm congee-water with brandy to drink.

Four o'clock, P.M.—No pulse to be felt. The draught remained upon his stomach. The pain at the epigastric region is removed, and there is less uneasiness in his head. Has only occasional attacks of spasms in the extremities.

There is a slight degree of warmth in his feet, and at the back of the head; eyes quite natural; face cold, and covered with a cold, clammy dew.

Rept. haust.; injiciatur enema anodynum statim. Contin. ut anteà, et frictio et balneum vaporosum.

Half-past four o'clock.—No change for the better.—Pergat.

Five o'clock.—Spasms removed; pain at the epigastrium gone. No pulse at the wrist. The pulsations of the carotid arteries are 120 in a minute, but very irregular; no pulsation to be observed in any other part of the body.—Continue as before.

Half-past five o'clock.—Exceedingly restless, and complains of great heat in his feet; I think I can feel the pulse, but it is so very weak I cannot be certain.—Cont. omnia.

Six o'clock.—No change for the better.—Pergat.

Seven o'clock.—The heat has certainly increased over his whole body, and there is less of the cold clammy dew; but he has no pulse at all at the wrist, and the tongue is white and perfectly dry. He is very restless, and very anxious to sleep. He longs for coffee. Let him have coffee, and continue the treatment as before.

Half-past seven o'clock.—Spasms have quite left him. He has no pain; wishes for sleep.

He lay perfectly quiet till eight o'clock, when his breathing became exceedingly oppressed and difficult; but he made no complaint. He sunk rapidly from this time, and died at ten minutes past nine o'clock,—six hours from his admission into hospital, and twelve from the time of the attack.

Examination of the Body.—Appearances are generally the same as those I have already described. The jejunum

is considerably inflated, and there are several dark red and purple spots on it.

Great congestion in the lungs and brain, with some serum in the cerebellic cavity.

The right side of the heart is loaded with blood, which, with a smaller quantity contained in the left auricle and ventricle, is quite black and thick.

CASE V.

Serjeant Gardiner Wilson, H. M. 84th regiment, was attacked with epidemic cholera, between nine and ten o'clock, P.M. of the 28th May, 1819, and was bled, but I was not informed of the quantity taken. On his admission into the general hospital, at one o'clock, A.M. of the 29th May, he had no pulse at the wrist; the skin was cold, and covered with clammy dew; his feet and hands were shrivelled, and of a blue colour; he had severe spasms in his legs and thighs, and was excessively restless. The tongue at present is dry and white, and the only pulsation to be felt any where is in the carotid arteries, which beat about one hundred and twenty times in a minute. His eyes are fixed and glassy; no sickness at stomach, but is purged frequently. The motions are watery and flocculent, like rice-water.

℞ Tinct. Opii,
Sp. Æther. Vit. āā ʒj.
Mist. Camphor. ℥j. M.
Ft. haustus, statim sumendus.

Let an anodyne enema be administered immediately, and his limbs be well rubbed with spirits of turpentine. The medicated vapour-bath.

Two o'clock, A. M. — Is excessively restless, and constantly calling to the coolies to rub his legs. He says that he had been drinking very hard previous to his attack. Does not complain of pain in his belly, but says he has great oppression at the chest, and every inspiration is made with an effort, as if there were not space for the lungs to act in.

Repeat the draught.

Blistering plaster to be rubbed up with the oil of turpentine, and applied over the chest, and a large cataplasm of mustard placed over the whole.

Repeat the enema, and continue the vapour-bath.

Three o'clock, A. M. — Complains, for the first time, of pain in his chest and heart. Head much confused, with the sensation of a noise similar to that of the firing of guns; skin cold, and not a drop of blood near the surface; eyes fixed, but not suffused; the pupils are contracted; has not derived the least benefit from what has been done. He appears to be sinking very fast.

Died at a quarter past four o'clock, three hours after admission, and between six and seven hours from the time of attack.

Examination of the Body.—The same appearances of the abdominal viscera are observed as have been already described, and the same degree of congestion also in the lungs and head. The only marked difference is, that in this case there is a greater quantity of blood in both ventricles of the heart than was found in any of those cases already described; but the blood in both ventricles is of precisely the same colour as it was in all those — it is very black and thick.

CASE VI.

John Belsh, private H.M. 13th Light Dragoons.*— Received into the general hospital on the 19th of June, 1819, at seven o'clock in the morning. It appears that he had been attacked about six o'clock the preceding evening, and had been very ill in the barracks during the whole night.

Cramps in his legs, arms, and stomach, were very severe; pupils of the eyes much dilated; countenance ghastly, and expressive of great general uneasiness; pulse labouring and fluttering; skin cold, and covered with a profuse, cold, clammy dew; eyes very much sunk in their orbits, and drawn up, shewing only the white part.

A vein was opened immediately, and the blood, which dribbled down the arm in thick sizy drops, was as black as ink. The opening in the vein was tolerably large, and more blood was abstracted in this advanced stage of the disease than I have before seen, though the depletion was not attended with the advantage I have sometimes witnessed.

He complains of excessive pain, and of a burning sensation at the umbilicus; pulse intermitting every third stroke, and exceedingly languid and hurried. Let him take the following draught immediately, and apply twenty leeches to the umbilicus: —

℞ Tinct. Opii,
Sp. Æther. Vit. āā ʒj.
Mist. Camph. ℥jss.
M. ft. haust.

* The 13th Dragoons had not landed at Madras many days before they were attacked with cholera.

Let an opiate enema, with camphor, be exhibited as soon as possible, the extremities be well rubbed with spirits of turpentine, bottles of hot water be applied to the feet, and small quantities of warm congee-water with brandy be given occasionally.

Half-past eight, A. M.—The spasms are relieved; pulse one hundred and four in a minute, but very thready; there is some warmth upon the skin. The leeches on his belly appear to be drawing very well; he has slept for ten minutes, during which time the pulse became fuller and stronger, and was reduced to ninety-four in a minute, but the instant he awoke I could not feel it at all.

Repeat the frictions and draught. Continue the warm congee-water with brandy.

Half-past ten, A. M.—He continued to sleep without interruption from a quarter past eight till twenty-five minutes past ten o'clock, and the pulse again improved: it is now fuller and more regular, and one hundred and three in a minute; more warmth upon the skin; eyes half open, the white part only to be seen. The leeches at the umbilicus have dropped off, and only shew two ounces of blood, which is *thick and black, like tar.* The pain and burning heat at the umbilicus are removed. He has no spasms; but he has shewn frequent inclination to retch, though he has neither had vomiting nor purging since his admission into hospital. Says that he feels great oppression in his head, but he does not complain much.

Let ten leeches be applied to each temple, and ten to the occiput and cervical spine. Give the following draught every fifteen minutes:—

℞ Aq. Ammon. ♏xxx.
Tinct. Opii ♏l.
Mist. Camph.
Aq. puræ, āā ℥ij.
M. ft. haust.

Half-past eleven.—Has been asleep for some time, and appears perfectly easy, but the pulse is very small and thready, and his strength is decreasing. Leeches quite inactive.

Twelve o'clock.—Sinking rapidly; no pulse; great oppression in the chest, and difficulty of breathing. He is quite insensible. Died at one o'clock. His breathing, for half an hour before death, was excessively laborious.

Inspectio Cadaveris.—The same general appearances are evident in the abdominal viscera as were remarked in former cases; *i. e.* the vermilion blush, and thick doughy feel of the small intestines.

The *liver* is healthy, and of a much paler colour than usual, and the gall-bladder is full of healthy bile.

The internal coat of the *stomach* has a dark bloody appearance, as if blood were extravasated between the coats.

The *lungs* are full of blood, as in the former cases.

The left side of the *heart* is much contracted, and empty, but the right is full of blood, and a considerable mass of coagulable lymph fills the right ventricle.

The vessels of the *brain* have precisely the same appearance as I have previously described, and there is a good deal of water in the ventricles. The veins of the choroid plexus are very turgid, but the arteries are bleached and empty. The cerebellum and vessels which envelope the medulla oblongata and pons varolii are minutely injected.

CASE VII.

James Brown, private H. M. 13th Light Dragoons, was received into the general hospital on the 24th June, 1819, at seven o'clock, A. M. Says he was first taken ill

at twelve o'clock the preceding night, and that nothing had been done for him till five o'clock this morning, when fourteen ounces of blood were taken from the arm.

When he arrived at the hospital, the pulse was nearly gone. I could, however, feel it, and although I could not number it distinctly, yet I fancied I could count ninety strokes in a minute.

He complains of confusion and giddiness in his head; no spasms; but there are pains and burning heat in the epigastric region and umbilicus. Let twenty-six leeches be applied immediately to the epigastrium and umbilicus, and twenty-four to the occiput and neck. Give the following draught:—

℞ Tinct. Opii,
Sp. Æther. Vit. āā ʒj.
Mist. Camphor. ℥j.
M. ft. haust.

Let an anodyne enema, with camphor, be exhibited as soon as possible.

Half-past seven, A. M.—Vomited the draught, which was repeated and retained.

Eight o'clock.—No spasms at all; the skin is moist and cold; pulse sinking; eyes sunk, and half open; has constant inclination to vomit, but does not throw any thing from his stomach; complains of much thirst, and has the sensation of excessive and burning heat in the body, though he is quite cold to the touch, and covered with a cold, clammy moisture.

Let him take the following pills immediately:—

℞ Calomel. gr. xx.
Opii puri gr. ij.
Ft. pilulæ jv.

Nine.—No vomiting or retching since the pills, and he has been dosing: pulse quite gone; skin of the hands and fingers shrivelled and wrinkled; a cold, clammy dew over the whole body, though he has still the sensation of excessive heat and oppression.

Let cataplasms of mustard and spirits of turpentine be applied to the legs and spine.

Half-past nine.—No pain, no spasms, but no improvement.

Repeat the calomel and opium.

Ten, A. M.—Has vomited a little watery fluid, had some sleep, and is now free from pain of any kind; no pulse; skin still cold.

Let the medicated vapour-bath be used.

Half-past eleven.—The sinapisms on his legs are very painful; those upon the spine are not felt; the pulse is returning, but is still very languid; has no internal pain.

Repeat the calomel and opium as before. Apply sinapisms to the inside of the thighs; and let him have a small quantity of brandy and water occasionally.

Half-past twelve o'clock.—The pulse is certainly stronger, and the skin is not so deadly cold. He thinks himself better, and imputes it to the brandy and water; has no pain or spasms; calls for warm water to drink, which is given to him.—Continue the treatment as before.

Three o'clock, P. M.—No visible change for the better; vomited a little at half-past two o'clock; will not drink any thing but warm water; speaks as if he were quite strong, and calls for an emetic.

The pulse left him again at half-past three o'clock; and he died at four o'clock, P. M. nine hours from admission into the hospital, and sixteen from the time of attack.

Dissection.—I think there is more appearance of general congestion in the omentum and small intestines than in any of the preceding cases. There are no marks of arterial excitement in the small intestines; but there are the same thickened appearance and pulpy feel which I have already described, as if the gut were glued together.

The *stomach* is very much contracted, and the veins spreading over the external and internal surface gorged with blood: this viscus contains some sero-sanguineous fluid.

The *colon* is much distended throughout with flatus. The *liver* is in a high state of congestion, and the gall-bladder distended with dark yellow bile.

The contents of the *chest* differ in no degree, in appearance, from the cases already noticed. The lungs and right side of the heart are gorged with blood, but the left side of the heart is empty.

The *brain* has precisely the same appearance as has already been described; the only difference is, that there is more water in the lateral ventricles than was found in any of the former cases.

CASE VIII.

Thomas Kershaw, a recruit belonging to the Honourable Company, and lately arrived from Europe, was received into the general hospital at a quarter past five o'clock, p. m. on the 9th August, 1819; and from the account given of him, it would appear that he had been seized with cholera about one o'clock, p. m.

The symptoms are, violent vomiting and purging of watery matter, like congee-water, with small pieces of rice floating in it; severe spasms of the extremities, abdomen, and epigastric region, with burning heat about the

navel; skin quite cold and clammy, but not livid; pulse not perceptible at the wrist; countenance sunk; hands shrivelled, like a washerwoman's; eyes dull, heavy, and depressed in their orbit, and half open. He complains not of thirst, nor is he very restless.

A vein was opened in both arms, and eight ounces of black thick blood were abstracted with much difficulty, but without visible advantage. The blood flowed from the vein in a languid stream, and was much thicker than oil. Let him have the following draught immediately:—

℞ Aq. Ammon. ʒss.
Tinct. Opii ʒj.
Mist. Camph. ℥jss.
M. ft. haust.

Six, P. M.—No alteration for the better. Has taken one ounce of the *drogue amère** in the same quantity of camphor mixture. Tobacco-smoke was thrown up the rectum, and the medicated vapour-bath used, but without any effect. He died at twenty minutes past six o'clock, one hour after admission, and five from the invasion of the disease.

* The following is the *drogue amère*, as given by a Jesuit:—

℞ Aloës Socot. ℔j.
Gum. Myrrh.
—— Mastich.
—— Benzoës,
Rad. Calumbæ, } āā ℥viij.
Croci Angelic.
Rad. Gentianæ, āā ℥iv.
Eau de Vie ℔xxxvj.
Geniëvre. ℔xij. M.

To stand forty days, then filter through paper for use.

Examination of the Body.

Abdomen.—The peculiar vermilion colour of the *intestines,* which has all along been considered as characteristic of epidemic cholera, was singularly striking in this case. The *jejunum* was considerably inflated, and the veins upon its surface beautifully injected. The thickened, pulpy appearance of the other small intestines, usually observed in this disease, extended throughout their whole canal. Very little, if any, change was observed in the *colon.*

The veins on the external coat of the *stomach* were highly injected; the internal surface was considerably corrugated, and its veins greatly congested: in some spots of the surface there appeared to have been considerable arterial action.

The *liver,* as usual in cases of this disease, was loaded with blood of a black colour, and had much of the appearance of bruised flesh. The *gall-bladder* contained no unusual quantity of bile, and there appeared to be bile in both the cystic and hepatic ducts, but there was none in the ductus communis choledochus. This duct evidently appeared to be obstructed,* but on making a smart pressure on the gall-bladder, the bile flowed freely into the duodenum, and, on closer examination, there was no difficulty in introducing a probe through the ducts.

No morbid change could be detected in the kidneys.† The *spleen* also appeared to be quite natural.

Thorax.—In order to ascertain the precise appearance

* Possibly from spasm during the disease.

† The kidneys were carefully examined, as it was observed that the secretion of urine was arrested in this and in the cases already detailed.

of the blood in both ventricles of the heart, and in the aorta itself, I tied the aorta and vena cava immediately above the bifurcation of the iliac vessels, and removed the heart and lungs from the body; the carotid and cervical arteries, with the veins, having been also previously secured. The following appearances were observed: —

The right auricle, ventricle, and pulmonary arteries, were, as usual, filled with black blood; and the left auricle, ventricle, and aorta descendens, *were likewise filled with black blood.* Upon opening the pulmonary artery, the blood seemed to flow with bubbles, as if it contained air.

The carotid artery I found quite empty, but pressure having been made on the lower part of the artery, immediately above the arch of the aorta, some blood was forced into it; and although the blood was not of a florid, arterial colour, it was certainly brighter than that found in the aorta descendens. The same appearance was likewise observed in the iliac vessels, *i. e.* the blood in them was of a brighter colour than that found in the aorta itself.

Head.— In the brain there was, as usual, considerable congestion, and the arteries of both hemispheres had the appearance of having been the seat of considerable action. Upon cutting into the brain, points of blood were observed all over the divided surface. There was some water in the lateral ventricles, and the veins of the choroid plexus were highly injected.

A little water was found at the base of the skull, and the arteries of the pons Varolii and those of the medulla oblongata, surrounding the seventh, eighth, and ninth pairs of nerves, were very turgid. There was a considerable degree of congestion in the membranes of the cerebellum.

I shall next detail some cases which illustrate the less severe appearance of the disease, and which occurred at the time when its epidemic violence had considerably abated.

CASE IX.

JOSIAH READER, ætat. 23, sergeant C. C. artificers, of a sanguineous temperament, was admitted at five o'clock of the afternoon of the 5th of October, 1823, complaining, since yesterday, of vomiting and purging, which supervened after drinking cold water whilst he was warm.

Was first seen at half-past five, P.M. when his eyes were sunk; his senses perfect. Has frequent vomiting and purging; stools watery, flocculent; severe cramp of the lower extremities; considerable burning pain in the epigastrium and head; pulse very small, thready, and extremely quick; great restlessness; skin hot; tongue white, moist, clean. The following medicines were at this time administered to him: —

℞ Calomel. gr. xx.
Opii gr. ij. M. ft. pilul. s. s.

Admov. hirud. xv. part. dol. abdom. et v. utrique tempori.

Cataplasmata sinapeos ad totam spinæ longit., ad suras, et ad epigastrium.

Seven, P. M. — I first saw him. Pain in the epigastrium was very severe; spasms of the superior and inferior extremities, and of the abdominal muscles, violent; pulse small, very quick, thready, almost imperceptible at the wrist; passes thin, watery, flocculent stools, involun-

tarily; skin of extremities cold, and covered with a clammy sweat; eyes sunk, features collapsed; is very restless; breathing natural; senses perfect; no passage of urine.

Habt. statim Calom. gr. xv. Opii gr. ij.

℞ Mist. Camph.
Drog. Amari, āā ℥ss.
Sing. semihoris repetend.

Habt. cyath. *brandy*, subinde.

Bibat pro potu communi aquam cum succo citrorum.

Fricentur crura brachiaque linim. camphoræ.

Fifteen minutes past seven, P. M.—Vomited almost immediately after taking the pill. Spasm still violent; has great thirst; other symptoms the same. Four men are constantly employed in rubbing his extremities. The friction evidently relieves him.

Rept. Bolus Calomel. et Opii.

Calomel. gr. xv. Opii gr. ij.

℞ Mist. Camph. ℥j.
Tinct. Opii ʒij.
Æther. Sulph. ʒij.
Sp. Ammon. ʒj.
M. ft. enema.
Contin. alia.

Thirty minutes past seven, P. M. — Did not retain the clyster; pulse quite imperceptible; other symptoms increased. Vomited shortly after taking the pill.

A glass of brandy.
Rept. Calomel. gr. xv.
Opii gr. ij.

Forty five minutes past seven, P.M. —Pulse rising, fluttering, hardly to be counted. Did not reject the pill. Symptoms continue violent, with occasional remissions. Continues to take the lime-juice as common drink. Complains much of thirst.

Contin. brandy et alia.
Lime-juice.

Eight, P. M. — Pulse rising, though still extremely small and thready. Cramps and pains continue violent; very restless and thirsty.

Contin. mistura, frictiones, et potus acidus.

Fifteen minutes past eight, P. M.— For the last quarter of an hour has been rather easier; pulse rising; skin cold.

Bottles of hot water and hot flannels to be applied to the extremities.
Contin. alia.

Nine, P. M. — Vomited during the last half hour. Cramps more violent; pulse fuller; skin of extremities cold, that of trunk natural; clammy perspiration; restlessness.

Contin. excitantia omnia.
Frictio.

Thirty minutes past nine. — No alteration; spasms occasionally occur; breathing is hurried; great oppression at the chest; pulse perceptible at the wrist, small, thready; countenance sunk; continual tossing in his cot; tears the bandage from his breast; calls out to the men to rub hard. Voice is hollow; stools frequent,

flocculent, involuntary; no urine; deafness and noise in the head.

℞ Calomel. gr. xx.
Opii gr. ij.
Contin. omnia alia. Frictiones assiduæ.

October 5th, ten, P. M.—Pulse much more perceptible at the wrist, about 130 or 140 beats in a minute, small, thready; eyes sunk, and half open; restlessness.

Contin. omnia.
Frictiones.

Fifteen minutes past ten. — For the last quarter of an hour has been extremely restless; cramps frequently recurred; he complains of great oppression and difficulty of breathing. The cramps are now more violent; lips livid; eyes fixed, and half open; great pain of abdomen; a blister applied to it. Great thirst.

Admov. empl. vesicat. abdomini.
Contin. alia ut anteà.

Forty minutes past ten.—The pulse became more perceptible; the other symptoms nearly the same as in last report. A vein was opened in the arm, and about eight ounces of dark thin blood were, with considerable difficulty, abstracted. During the bleeding, no perceptible change was produced.

Contin. excitantia, frictiones, &c.

He became more feeble afterwards; the cramp recurred with less violence and less frequency. He complained, however, of great difficulty of breathing, and oppression at the chest. In this state he lingered on till

twelve o'clock, when he died, seemingly from mere exhaustion.*

Sectio Corporis, ten hours after death.

Abdomen.—1st, *In situ.*—Peritoneum and omentum were natural. The *small intestines* had a peculiar, deep, florid, lake-coloured blush, resembling their appearance in injected preparations. The vessels were enlarged, and the capillaries filled with red blood. When the coats were handled, they communicated to the fingers a sensation of thickness and doughy softness.

The *colon,* as far as it could be seen *in situ,* was contracted throughout. The contraction, however, was greatest at the transverse and descending portions.

The *caput cæcum* and sigmoid flexure were of nearly natural size.

The *stomach* was considerably distended.

The *liver* appeared of a natural colour. A few white patches were observed here and there on its convex surface, but the substance beneath was healthy. The gall-bladder was nearly full of healthy bile. The ductus cysticus was contracted.

2d, *Ex situ.*—The stomach and intestines were removed for the purpose of a closer examination of them. Throughout, they had the same lake-coloured blush, which in the ileum assumed a purplish hue, from the greater degree of venous turgescence.

* In this case 88 grains of calomel were given, in order to try its effects upon the secreted matter covering the intestines, and already alluded to. The calomel was employed here in illustration of the experiments which had been previously performed with this medicine; for which see the chapter on the treatment of cholera, and the paper on calomel at the end of the volume.

On being cut into, the following appearances were observed :—The *duodenum, jejunum,* and the upper part of the *ileum,* were filled with a grayish-white, slightly viscid matter, which, especially in the ileum, much resembled cream. The inner coat of the *ileum* was encrusted with the same matter, but it was much more viscid and tenacious.* That in the duodenum was of a darker colour, and became more so when exposed to the air. A small quantity of cystic bile had flown into the upper part of it, and given it a slight yellow tinge. The whole of the inner surface of the intestines seemed softer and more glistening than in the healthy subject, as if they had been steeped some time in hot water, and then glazed over.

In the *colon* a small quantity of the white feculent matter was observed, but more fluid and transparent, resembling, in appearance, thin congee-water. In the lower part of it, and upper part of the rectum, a gelatinous, somewhat viscid, matter was found lining the inner coat.

The *stomach* contained about two pints of a dirty, greenish, muddy fluid, in which floated a few portions of more solid matter. The inner coat shewed nothing remarkable. It was incrusted with a viscid, grayish-green matter. The calomel which the patient had taken lay near the pylorus, slightly altered, and tinged of a gray colour.

The *liver* was sound. The portal vessels were rather flaccid. The vena cava inferior was much distended, and a considerable quantity of black venous blood issued from an incision made into the aorta.

* From this I infer that the calomel, in this instance, had no effect upon this peculiar secretion.

The *spleen* and *pancreas* were healthy, though the former appeared a little darker than natural.

The *kidneys* were gorged with blood.

The *urinary bladder* was perfectly collapsed.

II. Thorax.—*Pleura* healthy; *lungs* much collapsed, more loaded than natural at the back part.

Heart, externally, of natural appearance. The right auricle was full of dark venous blood, in a state of coagulation, with some portions of coagulated lymph. The right ventricle was nearly empty. The left auricle and ventricle were nearly as in the healthy state. In the latter, a little dark blood, and polypi of coagulated lymph, were observed. The aorta and pulmonary veins carried also dark venous blood. (The thymus gland was very large.)

III. Encephalon.—The *dura mater* was thick and shining. The veins were turgid, and several extravasations of blood had taken place. There was, likewise, a very small quantity of water found beneath it. The vessels of the *pia mater* were enlarged, and the membrane itself had an inflamed appearance. The ventricles contained about three drachms of serum. The substance of the brain was softer than common.

CASE X.

James Taylor, Oct. 27, recruit M. E. R., entered 8th Sept. 1823, *seven o'clock vespere.*—Was attacked with symptoms of cholera this morning. At present, skin cold; tongue excited, but moist; pulse very frequent and small; eyes much sunk; a considerable degree of restlessness; thirst urgent; complains of deafness, and dull pain in the head; has not been troubled with cramps during the last two or three hours, except in the upper

extremities. Has passed no urine since the accession of the disease.

V. S. ad ℥xxx.

℞ Hydrarg. Submur. gr. xx.
Opii puri gr. ij. statim.

℞ Mist. Camph. ℥j.
Drog. Amari ℥ss.
Ft. haust.

Enema purgans.

Empl. lyttæ sterno et abdomini.

Eight o'clock.—The cramps in the lower extremities returned; skin cold; tongue as before. The restlessness continues; eyes sunk; pulse very small, but frequent; thirst very urgent; the deafness and pain of head no better. His fingers cramped; no urine passed; one stool from the enema, of a light colour, and viscid-like mucus.

Nine o'clock.— No alteration.

Ten o'clock.—The same.

Eleven o'clock.— As before. No cramps since last report; skin of a more natural temperament; tongue excited, but moist; pulse small, 80; eyes less sunk; the restlessness not so great; thirst urgent; the deafness and pain of head much relieved; had one motion similar to the former, and has passed a little urine.

A little hot brandy and water occasionally.

Sept. 9th, seven, A. M.—Feels better this morning; has only had one stool since last report, watery, with portions of yellow viscid matter floating in it, and has vomited two or three times, and thrown up a dark green fluid, similar to the green watery stools sometimes passed from

the bowels. Pulse 120, small and soft; tongue much furred, and rather dry; skin hot; some cramps in the legs, but none at the epigastrium. Has great thirst, and burning sensation at the stomach; no headach, nor increased sensibility to light.

Pulv. Jalap. Compos. ʒj. ex Aq. Menthæ statim.
Potus Acidi Citrici.

Ten, A. M. — Pulse 120, and not so soft; skin temperate; no vomiting or stools since last report; expresses himself easy and free from pain; no cramps; still thirsty.

Enema purgans.

Eleven, A.M. — Pulse small and frequent, but soft; skin warm; tongue furred and dry; no vomiting nor purging since last report; voided a little urine this morning; free from pain; no cramps; eyes less sunk; still feels a slight deafness; thirst urgent.

Pulv. Jalap. ut anteà.
Cont. Potus Acidus.
Rep. Enema.

Horâ merid. — No alteration.

One, P.M.—No motions since last report; pulse small, but firm; skin warm and dry; tongue furred and moist; no cramps; eyes less sunk. The deafness continues; thirst unabated.

Rep. Enema.
Cont. Potus Acidus.

Three, P. M. — Has had one viscid, mucous stool since last report, of a yellow colour; pulse soft, but quick; skin warm and dry; tongue furred, moist; thirst

urgent; feels weak; eyes less sunk; still complains of the deafness.

Cont. Med.
Arrow-root with brandy.

Six, P. M.—One more stool, the same in appearance as before; pulse the same; skin moist; tongue furred; thirst urgent. The deafness better; no pain of head, nor cramps in the extremities.

℞ Hydrarg. Submur. gr. xx.
Opii puri gr. ij.
M. ft. pil. ij. h. s.
Cont. cætera.
Rep. Enema.

Sept. 10*th, seven,* A. M.—Pulse 108, and full; skin warm; tongue cleaner; no cramps; no pain in the abdomen or chest; stools watery and bilious; has had but little vomiting; no headach or deafness, but complains of a singing in his ears. Had but little sleep in the night; countenance looks better, and eyes not so sunk.

Cont. Potus Acidus.
Capiat Pulv. Jalap. C. ʒj.
Habt. Enema purg. stat.

℞ Mist. Camph. ℥j.
Æther. Sulph. ♏xx. 2dis horis.

A little arrow-root with brandy occasionally.

Three, P. M.—Pulse 100, full, and moist; skin good and moist; tongue foul; no cramps any where; no singing in the ears; no headach; stools feculent, loose,

of a green colour. Has vomited, several times, a green watery fluid, with a mucous sediment; countenance good.

Calomel. cum Opio.

Rep. cætera omnia.

Sumat Tinc. Opii, ♏xx. c. singulis dosibus Mist. Camph.

Sept. 11*th, half-past six,* A.M.—Pulse 120, full, and soft; stools bilious and offensive; has vomited a quantity of grass-green and very bitter fluid; skin temperate; tongue cleaner; slept but little; no cramps; no head-ach; still very thirsty.

℞ Pulv. Jalap. Comp. ʒj.
Cont. cætera omnia, ut heri præs.

Half-past five, P.M.—Pulse as before; stools green and watery; not so much vomiting; skin rather hot, tongue cleaner; no cramps; no headach; still very thirsty.

Rep. Calomel. &c. h. s. s. et cætera.
Omitt. Brandy.

12*th, seven,* A.M.—Stools green and watery, not very copious; skin cold and clammy; pulse imperceptible; tongue foul; says he feels light-headed; breathing oppressed; no vomiting; thirst continues. He died at nine o'clock.

Upon inquiry, it appeared that he had got up from his bed, and spent nearly the whole night in perambulating the wards, with no other clothing but his shirt. There is little doubt, therefore, that the favourable re-action which had taken place in the system, was, by this imprudence, at once arrested, and that a state of collapse suddenly supervened, from which he so rapidly sunk.

On examining the body, the appearances were—a great degree of congestion in the venous system of the brain, and still greater in that of the lungs, which were loaded with purple blood, so as to present the appearance of having been bruised. The right auricle and ventricle of the heart were distended with venous blood. In the abdomen, the appearances were such as fully to justify us in supposing, that, had it not been for this ill-timed exertion on the part of the patient, the disease would have proceeded to a favourable termination. The liver appeared healthy, the gall-bladder was *empty,* and there was no vestige of the peculiar, light-coloured, viscid secretion, which is so constantly found lining the internal coat of the small intestines (the duodenum and jejunum, particularly), obstructing their calibre, and preventing the operation of the remedies administered. No newly secreted or hepatic bile was present, but, on the contrary, the intestines were loaded with dark, soft, green-coloured contents, which, most probably, consisted of the above-mentioned viscid secretion, removed by, and intimately mixed with the purgative cystic bile.

CASE XI.

James Johnson, seaman on board H.M.S. Liffey, aged about 40.—Was suddenly seized on the morning of the third instant with severe spasms in both extremities; pulse scarcely sensible; eight ounces of blood were immediately taken from his arm, and he was afterwards put into the hot bath. His countenance soon became dejected, features shrunk, his fingers and nails blue and livid, and the whole body cold. Brandy, with tinc. opii, was frequently given him, and a single dose of calomel, with two grains of hard opium.

Considerable stupor from the opium; hot bath was repeated during the day; the spasms began to abate about nine o'clock, A. M.; but his skin remained cold, and his pulse nearly imperceptible, all day. He had violent and severe vomiting during this day.

Fourth.—Very restless all night, pulse being about 60, and extremely feeble; frequent vomiting and purging of white and watery stools; tongue loaded. Wine and water, and brandy and water, were given him frequently.

Fifth.—Has been more quiet all night; at present, four o'clock, P. M., vomited a little to-day; pulse pretty good; skin and extremities cold; complains of a griping pain in his bowels. This man has had frequent bowel and hepatic attacks since arriving in the country. As it is probable he will not recover speedily, on that account he is sent to the hospital.

Sept. 5th, six, P.M.—Was admitted into the Madras general hospital.* His countenance was pale and shrunk, lips livid, and eyes rather sunk and turned upwards; pulse small and quick; skin rather cold. He seemed very much inclined to dose, and was with difficulty prevailed on to answer any question. Expressed himself free from pain. At times he vomited small quantities of green fluid, and his stools were loose, and of a brown colour.

Sumat statim Hydrarg. Submur. ℈j. Opii gr. ij.
℞ Mist. Camphoræ ℥j.
Sp. Ammon. ʒj.
Æther. Sulph. ʒss. 2dis horis.
Brandy and water occasionally.

His breathing at this time was rather hurried, but

* For the previous part of this report I am indebted to Mr. Small, assistant-surgeon of the Liffey.

he seemed to pass the night as comfortably as his state would allow him. Towards morning he became very restless, and his breathing still more hurried. At six, A.M., these symptoms had greatly increased, and he was so restless as to be unable to lie on the same side for the space of a minute, and could scarcely be roused sufficiently to answer any question. Still he expressed himself free from pain either in the head or chest. About eighteen leeches, however, were applied—some to the nucha, some to the right side of the chest, in the direction of the intermediate space between the sixth and seventh ribs, and he took ʒj. of pulv. jalap. comp. in aq. menth. pip. This was not rejected by the stomach. A large blister was applied to the chest. From this time, however, he sunk rapidly. His countenance became more shrunk, his eyes sunk and immovable, their brilliancy gradually declining, his pulse imperceptible, extremities cold, and, notwithstanding the frequent exhibition of strong brandy and water, with spirit of ammonia, and the application of hot bricks, &c., he expired about eight o'clock.

Remarks on the Case.—This was one of the most instructive cases I have seen, and one in which the treatment seemed for a time to be beneficial. The pulse was restored to the wrist; the skin had not that colliquative dew and coldness upon it that are usual in the last stage of cholera; and, to all appearance, the case was manageable on his coming into the hospital. In the morning there was a sullenness and dislike to answer questions, excessive oppression in breathing, and restlessness; and, although the pulse was quite distinct, there was something indescribable in his general state that led us to fear danger. Supposing that the oppression arose from congestion in the lungs, leeches were applied, but they

had not been on more than a few minutes when the pulse at once sunk, and he died soon afterwards. The quantity of blood taken by the leeches was too insignificant to lead us to suppose that he sank under their operation. The mulled wine, camphor, ammonia, and opium, that were afterwards given, had no effect whatever; the blister that had been applied was discharging, but not freely. From all these circumstances I was particular in the examination, and the result is truly satisfactory.

*Dissection.**

" On opening the abdomen, the *stomach* presented itself very much distended. The *liver* was apparently healthy, and its size natural; and the gall-bladder *empty and contracted.* The small intestines presented a pale appearance, but with a great deal of venous congestion; and when held between the thumb and fingers, they occasioned a peculiar thickened feel, as if the internal coat were lined throughout with some deposition. On laying them open, the duodenum contained a quantity of bile, of a *light green colour;* the jejunum presented the same appearance, but with numerous patches of a *dark green, viscid substance,* lying loose on its internal surface. The *ileum* was rather contracted, and loaded with the above-mentioned dark green, viscid matter. The colon was found distended at the cæcum, but contracted in the course of the transverse arch; which contraction continued, though in a smaller degree, to its termination. On examining its internal surface, the villous coat, from the cæcum to about the sigmoid flexure, was much

* The account of the dissection was drawn up by one of my hospital assistants. I insert it in his own words.

thickened, and exhibited a great degree of congestion, which, at the commencement of the bowel, was so great, as to give the appearance of extravasation of blood. In the situation of the transverse arch, the mucous coat was of a brighter red, and the ramification of the vessels was distinct on its surface, though with occasional spots of a darker aspect. Towards the left side there was another large portion of the above dark colour, which again changed to the red, and this last gradually declined towards the rectum. There were no ulcerated spots observable.

"The examination of the chest presented the *lungs* in a collapsed state, with considerable venous congestion. The pericardium contained no fluid. The right auricle of the heart was distended with fluid venous blood. Both the ventricles likewise contained unoxygenised (or undecarbonised) fluid blood. The veins of the brain were preternaturally distended with blood, and the ventricles contained a small quantity of serous fluid."

Remarks on the Dissection.—From this examination, it is evident that a very important change had taken place in the intestinal canal. I may further add some of my own notes, made at the time when this interesting examination took place.

In general, the jejunum and upper part of the ileum had a flesh-coloured blush in the external coat. There was a great difference between this part of the gut and other parts, but the blush did not exist in the same degree. The pulpy feel and thickening of the coats of this portion of the canal existed, but there was not so much contraction of it as is usual when death is more sudden.

The whole of the small and large intestines were removed and laid open; and here the important change

was evident. The upper part of the duodenum was clear of every thing except its natural secretion, with here and there a speck of green viscid matter.

The internal coat of the jejunum was covered with green viscid matter, in greater quantity than in the duodenum; but evidently consisting merely of what remained after the greater part had been removed, either by the flow of bile or by the medicine.

The ileum was full of a mass of this green, viscid, tenacious matter, almost from its commencement to the cæcum. In the cæcum and colon was found a brownish fluid, like the colour of chocolate; and this fluid, though not in considerable quantity, was found throughout the large intestines.

This fluid was very distinct from the viscid matter contained in the small intestines, and appeared to be the secretion of the bowel tinged with a mixture of blood, perhaps from those portions of it where there appeared so much extravasation. It was not unlike what is often passed in cases of dysentery, where sloughing of the villous coat has taken place, and what should be called dysenteric stools.

From these circumstances, and from the gall-bladder being completely empty, the following reflections naturally arise: that the bile, having flowed into the duodenum, separated the white, viscid, and tenacious matter that was contained in the duodenum and jejunum, and was actually carrying it down to the large bowel, changing its nature from an adhesive white viscid substance to a green gelatinous matter, easily carried off by purgatives. I conclude it was the bile, and not the medicine, which had detached this particular substance; *first*, from the colour; *second*, from the gall-bladder being empty; and *third*, from its being impossible that any medicine could have given

it a green colour, and more particularly the medicine he had taken, viz. pulv. jalap. comp. If the powers of life, therefore, had held out till this matter had been removed, re-action might have taken place, and the patient might have been saved; but from the singular collapsed state of the lungs, from their congestion, and from the congestion of the brain, it would appear that the powers of life were oppressed, and that no known human art could, in this stage of the disease, have proved successful.

CASE XII.

Conrad Kingsburgh, seaman, aged 27, was seized suddenly, about two o'clock in the morning, with cramps in his toes and fingers, and a coldness all over the body. Pulse extremely feeble. At first the spasms were confined to his feet. A draught of tinct. opii ʒss. with ℥ij. of peppermint water, was ordered for him.

About six o'clock the spasms became more severe. He was put into the hot bath, the opiate draught was frequently repeated with brandy, but severe vomiting came on, and frequent stools of a white watery appearance. His pulse was nearly imperceptible at the wrist; and his fingers and toes assumed a cold and livid appearance. Countenance anxious.

About seven o'clock the bath was repeated. His pulse rose a little, and the sickness at stomach began to leave him. A few ounces of blood were taken from the arm, and stimulating draughts continued all day.

On the morning of the third he appeared much better; his extremities were not so cold; no vomiting nor spasms. He became gradually better, and yesterday convalescent. At present (three o'clock, p. m.) pulse good; skin cool; tongue foul in the centre; bowels loose; no pain or appetite.

Sept. 5th, six o'clock, P. M.—Was admitted* into the Madras general hospital at the same time with the foregoing case, (Johnson). At this time he had frequent retching, and occasional vomiting of yellow bilious matter; pain at the pit of the stomach, and his stools were scanty and watery. Pulse about 100, rather small; skin cold and clammy; countenance collapsed, and eyes turned upwards. His breathing was free, and he had no restlessness, but lay quietly on his back, and was with some difficulty roused, so as to be prevailed on to answer questions. A large blister was applied to the epigastrium; twenty grains of calomel with two of opium were administered; and he was ordered to take, every two hours, the camphor mixture, with spirit of ammonia and æther, and occasionally some hot brandy and water.

At six o'clock in the morning, I found, on inquiry, he had passed the night in the state above described. His pulse was nearly imperceptible, and he was evidently sinking. One drachm of pulv. jalap. comp. was given, which his stomach did not reject, and the same treatment was continued. He died about ten o'clock, A. M.

On examination, the head and chest presented the same appearances as in Johnson's case. The lungs were in such a state of congestion as to present here and there the appearance of having been bruised. The blood found in the heart was fluid and venous; and the right auricle and the two ventricles were filled with blood possessed of a similar character. The appearances observed in the abdomen were very interesting. The gall-bladder was distended with dark, green-coloured bile. The duodenum and jejunum were lined throughout their villous surface

* For the foregoing details I am indebted to Mr. Small, the assistant-surgeon of H. M. S. Liffey.

with the peculiar white and viscid deposition or secretion observable in all recent cases of cholera. In the duodenum this deposition had been displaced, and mixed with a quantity of hepatic bile, presenting a bright orange colour, (which, from the result of a subsequent experiment, was supposed to be caused, or at least rendered more intense, by the brandy which had been exhibited). In the jejunum the deposition was more viscid, tenacious, in larger quantity, and adhered pretty firmly to the surface of the intestine. Its colour was not influenced by the admixture of the yellow bile, but resembled that of cream. The ileum was empty, and contracted in several places: its external or peritoneal coat was not in so great a state of venous congestion, nor did it offer the thick pulpy feel, as the jejunum and duodenum. The internal surface of the colon did not appear to have suffered under much organic disease, and towards the rectum was contained a small quantity of thin, watery fæces, of a dark colour.

Remarks.—These two cases are individually very interesting, but when considered in connexion, and contrasted with each other, they become exceedingly valuable and instructive. It is pretty evident, that their conveyance to the hospital was too long deferred to offer any reasonable hope of recovery in either.

In Johnson's case, however, nature had done infinitely more towards the cure of the disease than in the other. The gall-bladder had disbursed its contents into the small intestines, and the cystic bile had displaced from its adhesions to the surface of the intestines, and nearly entirely dissolved, the viscid secretion which is peculiar to the disease, and which, in this case, was found floating in flakes among the contents of the intestine. We may reasonably infer, that if the previous effects of this disease had not been so debilitating, the bowels would have got

rid of their contents, and the patient might ultimately have rallied. There is one question, however, to be asked in this case: Whether the application of the leeches to the chest had any effect in hastening the patient's death? I think not; for he sunk so suddenly and rapidly, and the time was so short from their application to their removal, that the quantity of blood drawn must have been very insignificant indeed.

In Kingsburgh's case, the gall-bladder had got rid of none of its contents;* hepatic bile alone had found its way into the intestines, and the morbid deposition peculiar to this disease remained adherent to their villous coat, and obstructing their calibre. The disease, therefore, had evidently not advanced so far in its course; and it is not wonderful that the patient sunk eventually, when we consider that apparently the *vis medicatrix naturæ* (on his admission into the hospital) was not nearly so great as in Johnson's case.

CASE XIII.†

——— T————, Esq. was attacked, about three o'clock, A. M. 10th October, 1821, with frequent vomiting and purging of a watery fluid; he had severe pain at the scrobiculus cordis, excessive cramps in his limbs, and

* In an experiment made subsequently to the occurrence of this case, *cystic bile* was found to be the only effectual solvent of this peculiar viscid secretion, whereas, from the appearances in Kingsburgh's dissection, the *hepatic bile* was supposed not to possess that power in any degree.

† I add this case, as its history, and its progress towards perfect recovery, seem to me to illustrate both the nature of the disease, and several of the points of difference existing between it and the severer cases of common cholera.

constant thirst. I saw him at half-past nine o'clock, and I found the cramps in his legs, feet, arms, and hands, most distressing and severe; the pains continued at the scrobiculus cordis; thirst excessive; pulse small, and 130 in a minute; skin cold, with considerable moisture; countenance rather collapsed, and a great degree of anxiety in his look. He was constantly vomiting a colourless fluid, and his motions, which were frequent and distressing, were water, with some flocculent matter floating in it. At thirty-five minutes past nine o'clock, A. M. the following was given.

℞ Calomel. gr. xx.
Opii gr. ij.
Conf. Aromat. q. s.
Ft. pilul. statim sumend.

℞ Mist. Camph. ℥ij.
Sp. Æther. Vit. ♏xxx.
Aq. Ammon. ♏xl.
M. ft. haust. stat. sumend.

Palankeen boys were immediately set to work to shampoo, and to rub the legs, feet, arms, hands, and epigastrium, &c. with spiritus terebinthinæ.

This was continued without intermission, and at forty-five minutes past nine o'clock he thought the spasms in his legs relieved, though they continued severe in his hands and arms. Complains very much of thirst.

Continue friction with terebinthinum, to the legs, arms, epigastrium, &c. &c.

Ten o'clock.—The pains at his stomach increased, and are very distressing; feels very sick, but does not vomit; cramps returned with severity in his legs, and they continue in his arms and hands; pulse very languid and

thready. I can hardly number the pulsations, they are more than 130. Made an effort to be sick, but did not vomit; frequent retching.

℞ Infus. amar. ℥j.
——— Sennæ, ℥ss.
Tinct. Jalapii, ʒss.
——— Cardam. ʒss.
M. ft. haust. stat. sumend.

Continue friction without intermission.

Fifteen minutes past ten, A. M.—Feels great oppression at his stomach, and constant desire to be sick, but has not vomited or purged since he took the calomel. Has occasional relief from the cramps, but it is of short duration. The pulse is, I think, rather improved, though still exceedingly weak and frequent.

Continue the friction.

Thirty-five minutes past ten o'clock.—Vomited the last draught, and says his stomach is much relieved. I examined with attention what was thrown off his stomach, and was glad to see that there was no appearance of calomel, nor did the fluid smell of camphor; but I thought I could observe a slight tinge of green bile; this, however, was so slight, that I am not certain whether it was not a tinge given to the fluid by the brass basin. Pulse labouring very much; cramps continue severe.

Rep. Haust. Camph. u. a.

Forty-five minutes past ten.—He insisted on smoking a cheroot, and he is now smoking one. He feels rather easier, and the skin is certainly warmer.

Continue friction without intermission.

Eleven o'clock.—At this moment I was desirous of taking blood from his arms, but he declines it, as he feels satisfied he has no blood to spare. The pulse is quick and rather labouring, and this is the time when bleeding would be useful, in order to relieve the circulation, and it therefore ought to be resorted to; but he will not listen to it. The skin is warm, and there is no unpleasant moisture upon it; but the cramps continue more in his legs than arms.

Enema purgans stat.

Five minutes past eleven.—He passed a few drops of very high-coloured urine, which occasioned an unpleasant sensation at the neck of the bladder, that lasted some time.

Fifteen minutes past eleven o'clock.—Retained the enema till now, when he passed it exactly as when thrown up. He felt much exhausted after it; but his skin is certainly warmer, and the pulse, though still 120 in a minute, is firmer that it was, and the cramps are somewhat less severe.

Continue the friction.

Thirty-five minutes past eleven o'clock, A. M.—Had another stool, rather copious, watery, with floccula: he feels a singular degree of exhaustion after every attempt to relieve his bowels; but I am glad to find that his skin still retains its warmth, and that the pulse, though weak, is very distinct, and 120 in a minute: thirst distressing.

Sent for acid drink, and for some doses of the compound powder of jalap.

Fifteen minutes before twelve o'clock, A. M.—Cramp still continues, and he feels more uneasiness and pain at the stomach, but he does not complain of the burning heat at the præcordia.

Continue the friction.

℞ Drog. amari ℥ss.
Aq. puræ ℥j.
M. ft. haust. statim.

Five minutes past twelve.—Vomited the drog. amarus. The cramps in his legs continue.

Apply mustard poultices to both legs.

Continue to rub the whole belly and stomach with sp. terebinth., and prepare sinapisms for the belly.

Rept. Haust. Camph. u. a.

Half-past one, P.M.—Pulse much improved, fuller, and stronger, but intermits at every ten or twelve strokes. The skin is warm, but the spasms in his legs continue. Bleeding was again urged by Dr. Harris and myself; but he still positively refused to have any blood taken from him.

Enema purgans.

This remained with him near an hour, and brought away much glairy mucus and watery fluid. There is an amazing quantity of glairy white mucus in this motion, and he feels exceedingly exhausted.

Half-past two, P.M.—Feels an excessive degree of general irritation about him, and the cramps have returned with more severity; his pulse has become weaker than it was, and his skin is covered with a profuse cold perspiration. Complains again of nausea and sickness at stomach, but does not vomit. The sinapisms are so painful that he will not allow them to remain upon him.

Cont. frictiones.

Refuses to take the camphor draught.

Forty minutes past two, I prevailed on him to take the following draught:—

℞ Pulv. Jalapii comp. ʒj.
Aq. Menth. pip. ℥ss.
M. ft. haust.

This remained upon his stomach, and at a quarter past three o'clock he was fast asleep, and slept with very little interruption till four o'clock, P.M. when his pulse again became full and soft; skin warm, though the cramps continue, but they are not so frequent or severe; and he has less sickness.

Cont. frictiones.

Quarter to five, P.M.—Had another motion, very small in quantity, and precisely like the last; but he was not so much exhausted as he previously has been after each motion. His skin continues warm, and his pulse, though quick, is full and strong. He has had a very profuse perspiration, and I think him much relieved by it; the cramps do not come on so frequently, nor are they so severe; and he has less sickness at stomach.

Ol. Ricini, ℥j.

Quarter past eight, P.M.—Rept. enema, u. a.

He slept a good deal, and perspired freely, between six and eight o'clock; retained the enema till nine o'clock, when he passed a very offensive motion, of a pale muddy colour, watery, and without the appearance of fæces.

Quarter before ten, P.M.—Felt sick, and vomited part of the oil; cramps not so severe; pulse quick, but soft and full; skin of the natural temperature; tongue excited; says he feels great uneasiness and sickness at the stomach, and a griping sensation in his bowels.

Ten o'clock.—Fast asleep, and he breathes freely and distinctly.

Quarter to eleven.—Has only just now awoke; he

feels sick, and has drank largely of warm water, and has vomited; but nothing came from his stomach except the pure water which he had drank. His mind has been wandering much in his sleep, and he has been desirous to know whether the cholera is under the direction of the supreme court, or the Sudder Adawlut; he thinks it ought not to have remained so long upon him.

Twelve o'clock at night.—Fast asleep, and slept tolerably sound, and without any kind of disturbance, till ten minutes past three o'clock, A.M. He awoke with a desire to relieve his bowels, and passed a motion, watery, and with flocculent matter, but nothing at all like fæces. His pulse is more regular and less frequent, full and strong; no pain in his belly or head; cramps much less frequent, and, on the whole, I consider him greatly better.

℞ Pil. Colocynth. gr. iij.
Cal. gr. iij.
Pulv. Antim. gr. ij.
Syr. q. s.

Ut fiat pilul. to be taken immediately, and repeated every two hours.

Half-past five, A. M. 11*th Oct.*—Has slept till this time, and has taken another pill; has some cramps still in his legs, but feels perfectly easy in his belly; pulse full and soft, 88 in a minute; skin of a natural heat; no feculent stools as yet; his tongue is clean, but he complains of great thirst.

Six, A. M.—Repet. enema purgans.

Seven, A. M.—The enema has just now come away, with some glairy mucus, similar to what has been already noticed, and small pieces of broken fæces.

Rept. pilula.

Nine, A. M.—Has felt a good deal of sickness at

stomach, and has drank a considerable quantity of warm water, which has produced vomiting, but only of the water he has drank, and he feels relieved by it.

Twenty minutes past nine o'clock.—Rept. haust. Jalapii, ut anteà.

He went to sleep immediately after taking the draught, and slept till half-past ten, when he awoke, and felt refreshed. The draught has not occasioned any disturbance in his stomach; he feels quite easy.

Quarter before twelve.—Had a motion from the medicine, of curdled feculent matter, exceedingly offensive, and slightly marked with bile. Feels sickness at stomach, but no vomiting; pulse good; the cramps occasionally attack his legs and arms, and the palankeen boys are constantly shampooing him; and his limbs are occasionally rubbed with sp. terebinthinæ.

Rept. enema, u. a.

Twelve o'clock, noon.—Purged by the enema; motions feculent, morbid, and offensive; there is bile, but it does not seem to flow freely. The cramps still continue.

Apply a large blister over the epigastric region.

[This was *not* applied to *remove pain*, but to remove spasm from the biliary ducts, and to promote a free flow of bile.]

Cont. pil. u. a.

He slept from this time till one o'clock, P.M., when he awoke complaining much of sickness at stomach, which he imputed to the pills, and will not take any more. Has drank a good deal of warm water, but has vomited nothing, however, except water; cramps severe in his legs; no effect, as yet, from the blister.

Quarter before two o'clock, P. M. — Pulse 86, firm, regular, and full; complains of being sick at stomach. There is a warm moisture on his skin; he feels griping pains in the lower part of his belly — probably the effect of medicine.

He will not take an enema, which I am anxious to give him, nor any more medicine.

Three o'clock, P. M.—Had a motion of dissolved fæces, with more bile than usual, and in tolerable quantity, after which he slept till four o'clock. He now complains of nausea and sickness at stomach; drinks warm water, and makes himself sick: this is done in defiance of all my objections. He will not take medicine to aid the operation of what he has already taken. Fancies there is a stricture in the gut, and that whatever he takes does more harm than good; in short, he has such singular notions of his disorder, of his own medical knowledge, and of the effects of medicine on his peculiar constitution, that all my persuasion is perfectly useless. He is now, certainly, out of all danger; but should he continue to abstain from taking such medicines as may be required, or such nourishment as may be essential to his recovery, it is quite impossible that I should be answerable for the consequences. The blister is doing its duty well.

Ten minutes before five, P. M. — Has had another motion, of precisely the same appearance as the last.

Half-past six, P. M. — Has taken a very small quantity of congee-water, which is the only thing like nourishment he has had for the last forty hours. The sickness at stomach, of which he has complained so much lately, is considerably diminished — a circumstance which satisfactorily proves that its continuance depended on the want of food.

Quarter past eight.—Had another motion, of the same kind as the last; has less sickness and cramps; skin warm and comfortable; pulse good; slept from half-past eight till half-past nine o'clock; he awoke exceedingly thirsty, and drank some toast and water, complaining, for the first time, of feeling weak. He will not take his broth, as he promised to do; feels less sickness and spasm. Slept from a quarter to ten to a quarter past eleven o'clock; his pulse is 88 in a minute, full, distinct, and regular; natural temperature, with a good moisture; has not been moved in his bowels since eight o'clock, P. M. The blister has risen well, and is dressed; feels very weak; took a glass of soda-water, which he found exceedingly agreeable, and went to sleep again.

Twenty-five minutes past one, A.M.—Has slept soundly till this time; pulse continues good; skin natural and moist; great thirst; less sickness at stomach; has occasional cramps in both legs and arms. Drank a glass of soda-water.

12*th October, half-past five,* A. M.—Has passed an excellent night. His pulse this morning is very good; skin natural, and tongue clean; no cramps; feels some uneasiness and confusion in his head, but can bear the light of a candle, or any other strong light; has sickness at stomach, and bitter taste in his mouth; had a small, fluid, bilious motion; is very drowsy, though he thinks himself stronger. Probably these symptoms may arise from some bile having regurgitated into the stomach, from the constant vomiting he has kept up by drinking hot water.

Half-past six o'clock.—Dressed the blister, which discharges freely. Let him have an enema every four hours.

Seven o'clock.—He took a cup of tea, and sat up in a chair till eight o'clock, without inconvenience or fatigue, when he took a second cup of tea. Had one feculent

motion, exceedingly well marked with healthy bile, but is offensive; feels rather exhausted after this motion, and has retired to his couch; no cramps nor pain of any kind.

Nine o'clock.—Has taken an enema; it operated in half an hour; motions highly bilious. He complains of excessive sickness at stomach; pulse good.

Ten o'clock.—Has vomited an amazing quantity of yellow bile, and has drank a good deal of warm water.

Half-past ten, A. M.—Had another stool, and vomited more bile; pulse good; skin natural; cramps completely removed.

Half-past eleven, A. M.—Sickness continues, and he vomits more bile. Drinks plentifully of warm water.

One o'clock, P. M.—Has not had any vomiting since last report. Feels greatly relieved in his head, and in every other respect. Has taken a glass of soda-water, with a little wine; pulse good; no motion.

Two o'clock, P. M.—Has had a motion, highly bilious, with broken fæces, and a very unusually strong smell of urine in it; still feels sickness at stomach and fulness of the belly, but no vomiting.

Half-past five o'clock, P. M.—Slept perfectly sound from half-past two o'clock till this time, when he awoke, complaining of feeling bilious, and very thirsty; pulse good; skin natural. Took a glass of soda-water with a little wine; he is certainly greatly better in every respect, and though he feels heavy and drowsy, yet he has no symptom that gives me the slightest uneasiness.

Repet. enema purgans, ut anteà.

The enema has operated; motions the same as before; highly bilious; he says that he feels sick and faintish after each enema, which feelings remain on him for some time.

Quarter to eight, P. M.—Feels a good deal of restlessness, and nausea at stomach; he drinks warm water, and

vomits a little bile; pulse much fuller, but soft, and 72 in a minute. Tongue rather excited; feels thirsty; slept occasionally from this time till half-past ten o'clock, and at that hour he took the following draught, and slept till half-past twelve o'clock:—

℞ Infus. amar. ℥jss.
—— Sennæ ʒvj.
Tinct. Cardam. ʒiij.
M. ft. haust.

At half-past twelve o'clock he awoke. Still complains of thirst, but his pulse continues good, and he has less restlessness and sickness at stomach; and feels much better altogether since his last sleep.

A glass of soda-water.

One o'clock, A. M.—Awoke and took some cold water, and went to sleep again immediately.

Two o'clock, A. M.—Pulse good; stomach easy; skin natural; tongue the same as at last report. Slept from this time till four o'clock, A. M. when he awoke, complaining of excessive thirst; but he had neither sickness at stomach nor cramps. Removed from his hot room to the hall, and slept till half-past five o'clock, A. M.

12*th, half-past five o'clock*, A. M.—Says that he feels a soreness over him, as if he had been beaten. Feels languid and weak; no headach; stomach better; tongue rather excited, but not very foul; pulse 72 in a minute; skin natural.

Repet. haust. amar. cum sennâ, u. a.

℞ Mist. Salin. febrifug. ℔j.
Aq. Ammon. ♏xxx.
Sp. Æther. Nitros. ʒj. M. ft. mist.
A glass every two or three hours.

Twelve o'clock, noon.—Has had one very copious, bilious, and feculent motion; pulse good; skin natural; countenance clear and animated, but he feels weak and languid. Tongue clean and healthy.

One o'clock, P. M.—Took some beef-tea with a relish; this is the first food he has taken since the attack.

A glass of soda-water.

Continued remarkably well during the whole day, and took his aperient draught at bedtime.

13*th, six o'clock*, A. M.—Passed an excellent night; had no motion, but made a great deal of urine during the night; pulse 72; skin natural; no pain nor cramps of any kind; says he feels weak and languid. Would not repeat the bitter mixture, lest the tincture should disagree with him; but took some tea.

Two o'clock, P. M.—Has had a small motion, perfectly consistent, smooth, and very tenacious; makes water very freely. No pain nor uneasiness of any kind; fancied the tea he took disagreed with him, and occasioned flatulency and irritation. He has taken no medicine to-day, and now fancies a glass of sherry wine and a biscuit.

14*th.*—Passed a good night, and took, at five o'clock this morning, ʒj. Pulv. Jalapii Comp. in a glass of Aq. Menth. Pip. At half-past seven o'clock it operated, and brought away four very large, feculent, offensive, and highly bilious stools; he felt a good deal exhausted afterwards, but slept till four o'clock, P. M., and awoke much recovered.

A glass of soda-water and wine.

15*th.*—Passed an excellent night; pulse good, 76, regular, soft, and full. Tongue clean; but he feels languid.

16*th*.—Quite well.—Repet. haust. Jalapii, which operated well, and brought away hardened fæces in considerable quantity, with a good flow of bile.

17*th*.—Passed a good night, and went out this morning in a palankeen.

18*th*.—Mounted his horse and rode out this morning. I now considered him quite well, but advised him to guard against constipation. He takes the following pills:—

℞ Pil. Hyd. gr. j.
Aloës cum Myrrh. gr. ij.
Syr. q. s.
M. fiat pilula, omni nocte vel p. r. n. sumenda.

19*th*.—The pill procured him a good motion. He feels quite well, and commenced to eat meat this day.

SECTION II.

Pathological Observations and Inferences, &c.

The reader may observe, from the details of the appearances observed in the dissections accompanying the cases now detailed, that the lesions produced by the disease in the solids were not such as necessarily, of themselves, tend to a fatal termination. It was in my power to have given the particulars of a greater number of cases in which *post-mortem* inspection was performed; but as the morbid appearances were nearly the same in all, and as the history of the progress of the disease in each was almost precisely alike, I

have abstained from adducing more of the details than seemed to me to be necessary to the full illustration of the subject. Although the solids presented but few derangements, and these not always of a very serious nature, yet the condition of the circulating fluid, as observed both during the life of the patient and on inspection after his death, seems to me to be such as to account for many of the symptoms of the disease, and for their rapid progress towards a fatal termination.

Before I proceed to inquire into the essential or efficient cause of the disease, I will first take a general view of the alterations presented by the different textures and fluids of the body, and of the relation which seems to exist between these alterations and the phenomena characterising the disorder. Having thus brought before him a statement of the lesions in which epidemic cholera usually terminates, the reader will be possessed of grounds whence he may proceed to draw his own inferences respecting the nature of the pathological condition constituting the earlier stages of the disease, and thence to infer the nature of the causes from which it seems to originate.

External Surface.—The appearances observable in subjects at the period of dissection were, a corrugated and shrunk state of the extremities, considerable lividity of the surface, and dark purplish colour of the lips and parts not covered by the cutis vera. The soft solids were

apparently shrunk; the eyes sunken, the features astonishingly collapsed and ghastly for the short duration of the disease, and the vessels at the surface contracted and bloodless.

Head.—The sinuses and veins of the brain and of its membranes were always congested with black, thick, and viscid blood. The tunica arachnoidea was frequently opaque, and somewhat thickened and adherent to the adjoining membranes. Some gelatinous or serous effusion was often observed in the ventricles, and between the membranes. The brain was sometimes soft and pulpy, but it seldom presented any very decided marks of increased action.

The congestion of black blood, and the serous effusion so often observed within the cranium, seem to account for the stupor, deafness, vertigo, and noise in the ears, generally present during the life of the patient; and it was usually found that the lesions just alluded to were more marked in the cases wherein those symptoms were most manifested.

Thorax.—The *heart* and large *venous trunks* were generally distended by a thick black blood, which in some cases was fluid, in others semi-fluid; and when coagulated, having the appearance of a black friable jelly. The substance of the heart sometimes appeared softer, and more easily lacerable than in the healthy state. The *lungs* were generally shrunk, collapsed, filled with

black blood, were heavier than natural, and presented a fleshy, hepatised, or bruised appearance. The *pleura* was usually pale and healthy; the *pericardium* natural, and sometimes contained a very small portion of serum.

The relation which these lesions bear to the derangement of the respiratory and circulating functions observed in the course of the disease, seems sufficiently evident. These lesions, also, were remarked to be great in proportion to the extent to which these functions respectively were deranged. Whilst, however, I am ready to grant that a great part of these derangements was merely consequent on death, yet I must contend, that much of them had taken place before that issue occurred; and that the depression of the vital energy of the organs, at the time of the invasion of the disease, gradually led to, and became accompanied by, many of the derangements which these organs presented after death.

Abdomen.—Upon opening the abdomen, a peculiar offensive odour—as remarked by Mr. Jamieson, in his Report of the Medical Board of the Bengal Presidency, respecting this disease—was sometimes observed, particularly in those who died suddenly. The *stomach* generally contained more or less of a watery, muddy, and sometimes a grumous fluid. The appearance of this fluid was various; sometimes it was colourless,

at other times greenish, or passing to a yellow tint, and in some cases it was brown, approaching to black. The peritoneal surface of the stomach seldom presented any other appearance than a greater congestion of the veins than was natural. The mucous surface was sometimes covered by a dark-coloured slimy mucus, and when this was removed, considerable congestion of the venous capillaries was observed. This congestion seemed to be chiefly seated in the sub-mucous cellular membrane, and was occasionally so extensive in particular points as to give the appearance of ecchymosis of this coat. The internal tunic was occasionally much corrugated, seemingly thickened, and doughy to the touch, more especially when it was not much distended by fluid or flatus. The stomach was frequently flabby and relaxed, and its coats could be more easily penetrated by a harder body than usual. In those cases in which some degree of re-action of the vital energies had taken place, the internal surface of this organ, particularly about the pylorus, presented a livelier colour, approaching to red, and was apparently thickened and contracted.

The omentum was sometimes corrugated, or thrown to one side of the abdomen.

The *small intestines* were, occasionally, more than usually constricted in parts, frequently distended by flatus, and their veins generally

engorged with black blood: externally, they presented a doughy, thickened appearance, and their colour varied from a pale vermilion, through all the deeper shades, to a dark purplish hue; the former being chiefly remarkable on the peritoneal surface of the duodenum and jejunum, the latter in the ileum, about where it terminates in the cæcum. These shades of colour appeared to arise from the different degrees of congestion in the capillaries and veins in different parts of the canal, from the injection of the arterial capillaries, and from the colour of the blood which the vessels contained.

When the small intestines were laid open, their coats seemed thickened, especially if the intestine was not distended, or if it was in any degree contracted; they were frequently flabby, and more easily torn than usual. The internal surface was generally found covered by a viscid, thick, and clay-coloured substance, which sometimes passed to a cream or yellowish tint. This was particularly remarked in those who died after a sudden and short attack of the disease. When this matter was removed, the mucous coat itself was usually pale in the upper portion of the small intestines, and dark coloured and congested in the lower part, particularly where the ileum is blue or purplish externally. When the disease was of longer continuance, and more particularly when some re-action of the powers of the system had

taken place, this viscid appearance was detached to a greater or less extent, and was floating in the fluid contents of the small and large intestines; and the mucous coat then seemed more vascular, and the arterial capillaries appeared more injected, than in the former class of cases.

The *large intestines* were frequently contracted, sometimes they were distended, and at others they were both contracted and distended in different parts in the same case. Congestion of the veins and venous capillaries was generally evident, especially in the cellular substance connecting the tunics. The external coat was commonly dark coloured, owing to the blackness of the blood in the congested vessels. The mucous surface was frequently very vascular; sometimes it presented a dark red colour, especially if the patient had lived for some time, and strong stimulants had been administered. These intestines never contained any fæces, and the fluids met with in them were generally similar to those found in the stomach and small intestines.

Mention has already been made of the vascular appearances of the small intestines, and of the symptoms referred to the umbilicus during the life of the patient; and the connexion between both seems evident. The irregular contractions and dilatations of the intestinal tube, and the abundance of flatus in it, evidently appear, from

the early existence of the colicky pains, to follow close upon the invasion of the efficient cause of the disease; and these pains may, consequently, be considered as an index of the first stage of these structural derangements, which, although originating in a defect of vital energy, may be farther increased by the morbid condition of the blood circulating in the vessels of these parts.

The *liver* was generally darker than natural, and loaded with black thick blood. Sometimes this organ presented a purplish or dark blue colour; at other times it was mottled, enlarged, flabby or pulpy, and easily torn.

The *gall-bladder* was always distended by thick viscid bile, which was generally of a dark green or black colour, in subjects who died before the appearance of bile in the excretions; and although the hepatic duct was large and permeable, the mouth of the common duct was generally constricted, and seldom permitted the bile to flow into the duodenum without considerable pressure made upon the gall-bladder. In those cases which terminated fatally after an illness of long duration, and in which some re-action of the vital energies and a flow of bile into the intestines had taken place, the gall-bladder was generally empty, or contained but a small quantity of healthy bile; and the common duct, although not always free from some degree of constriction, was generally more permeable than

in the former class of cases. In a few instances the gall-bladder was quite empty, relaxed, and flabby. In almost all the cases wherein bile was observed in the excretions, and the gall-bladder was found empty on dissection, and consequently when it could be legitimately inferred that this secretion had passed into the intestines during the life of the patient, I remarked that the viscid matter usually found lining the mucous surface of the small intestines, in the former description of cases, was detached to a greater or less extent, and was either floating in the fluid contents of the large intestines, or entirely removed, along with the matters which had been ejected from them.

The *spleen* was generally enlarged, and engorged with black blood; and its texture was frequently soft. In some cases it fell to pieces whilst the examination of it and the adjoining parts was being performed, owing as much to an inordinate degree of distension as to relaxation or softening of its texture. The colour of this viscus was uniformly darker than usual.

The *kidneys* were generally of a healthy structure, and presented no organic derangement which could explain the complete interruption their functions had experienced in the course of the disease.

The *urinary bladder* was generally empty, and shrunk under the pubis: its mucous surface was

frequently covered with a considerable quantity of a viscid mucous secretion. The contracted state of the bladder was evidently the result of the absence of secreted urine.

The *blood.*—The peculiar appearance of the blood particularly excited my attention in the first case of the disease which came under my care. In every dissection which I performed, I uniformly found the venæ cavæ, the mesenteric veins, the veins in the vicinity of the heart, the vena portæ, the iliac and subclavian veins, and the sinuses of the brain, loaded by a thick, viscid, and black blood. The right cavities of the heart were generally distended with the same description of blood, and when any was found in the left cavities of this organ, it was similar in appearance to that lodged in the right. The lungs were always completely engorged with blood, of a pitchy or black appearance, and all the internal viscera presented a greater or less degree of congestion of blood, possessing nearly the same characters. The vessels at the external surface of the body and in the extremities were generally contracted and empty, or nearly so.

That this condition of the circulating fluid was not consequent on death, although it might be more or less heightened thereby, is evident from the appearances which this fluid exhibited when taken away from a patient even at an early period of the disease. During the subse-

quent stage, and more especially as the disease advanced to a fatal issue, the particular characters of the blood which have been now noticed, were the most manifest, as may be seen in the details of the foregoing cases. That this state of the blood was the first material derangement consequent on the invasion of the efficient cause of the malady, I shall not contend; but that it was one of the earliest links in the chain of effects consequent to that cause, and that it afterwards tended, by a necessary and evident process, to heighten and to perpetuate the derangement whence itself sprung, I have not the least doubt. That the nervous influence, in some manner or other, received the first impression of the morbid cause, and afterwards gave rise to this condition of the circulating fluid, may be inferred, if we be permitted to conceive that a diminished function of the lungs, liver, and other excerning viscera, was co-existent, or nearly so, with that primary change; and consequently, that the blood did not undergo an elimination of its effete and noxious constituents, to an extent requisite to the performance of the organic actions and the continuance of life.

The appearances on dissection, both as respects the solids and fluids, were precisely the same in the natives of the country as in Europeans. The only difference, and which does not affect the general inference, was, that in the

former the disease usually terminated rapidly, the powers of life being readily overpowered, and that congestion after death was generally remarkable in these; in the latter, re-action more frequently occurred and consequently appearances of capillary action were more observable in them than in the former.

CHAPTER IV.

OF THE CAUSES OF THE EPIDEMIC CHOLERA.

Having stated, as circumstantially as I am able, the phenomena characterising the invasion of the epidemic cholera, and its progress to a fatal termination, (which appears to have been its usual issue during the height of the epidemic, when uncontrolled by a judicious mode of treatment), or to a return to the exercise of the healthy functions; and having detailed the appearances exhibited by the internal viscera upon dissection, the next objects of inquiry which present themselves are, the causes to which we may impute the ravages which this malady has committed on the population of the East. As the symptoms of the disease, and the lesions remarked after death has taken place, are so intimately related to its efficient or proximate cause; and as the transition from the consideration of the one to that of the other is both natural and necessary to the full exposition of my subject, I shall first proceed to offer some opinions respecting the probable efficient cause of the disease, and next adduce some remarks as to the predisposing and occasional or exciting causes which seem to co-operate with the foregoing one, and to occasion, by means of such co-operation, the

development of that peculiar train of morbid actions constituting the disease under consideration.

SECTION I.

*Of the Efficient or Proximate Cause of the Disease.**

The morbid appearances so uniformly exhibited throughout the cases I have detailed, and the summary statement I have adduced in the second Section of the foregoing Chapter, shew that venous congestion was manifested, to a greater or less extent, in every stage and in every instance of the disease, more particularly in the fatal cases; and that this congestion differed only in degree, according to the strength and vigour of the patient, and the activity or intensity of the cause.

I have already shewn that the venæ cavæ, the right auricle and ventricle of the heart, and the pulmonary arteries, were, in every case, loaded with blood. The pulmonary veins also returned black blood to the left auricle and ventricle of the heart, and when blood was found in the arteries it was black and viscid. The liver and spleen were in a high state of congestion; and

* I must be understood as using the words *efficient* or *proximate*, in their present application, as synonymous terms.

the vessels of the brain, both veins and arteries, were extremely turgid with the same kind of blood.

This singular and sudden change in the circulating fluid appears to be the effect of some uncommon influence over the vital powers; but it is a question, what that influence is, and how that change is produced, which thus deranges the functions and general balance of the circulating organs, and which seems to deprive the system of the power of producing those changes on the blood which are requisite to the purposes and continuance of life.

In death from suffocation, we know that the heart continues to pulsate for some time after breathing has ceased, that the blood passing through the pulmonary vessels no longer receives the influence of oxygen, and consequently that black blood is circulated: we know, moreover, that arterial blood alone can support the energies of the brain; and therefore, that the influence of black blood upon this organ must be deleterious to the whole circle of the vital actions.

Bichât has proved, that when black blood has been injected into the vessels of the brain, the functions of this organ become immediately disturbed, and very soon cease.

Mr. Brodie has observed, that "dark-coloured blood, which has been transmitted through the circulating system during the suspension of re-

spiration, would seem to act like a narcotic poison upon the brain. No sooner does it enter that organ, than deleterious effects are immediately produced: the animal falls into a state of stupor, the pupils of the eye become dilated, the respiration is laborious, the muscles of the body convulsed, and the animal dies poisoned by its own blood."

This fact seems to explain many of the symptoms of epidemic cholera; but I must observe, that although the circulation generally was remarkably weak from the first, and the pulse at the wrist could seldom be felt, yet respiration never ceased altogether, although it was performed with great labour and difficulty; and sometimes, especially at the close of life, was much slower than usual. The senses, too, were generally retained to the last moment of life, although stupor, deafness, and deficient sensibility, were often very considerable. It would appear, however, that notwithstanding respiration was continued, the blood was either not oxygenated, or imperfectly so; and the patient sunk like one who dies from the poisonous influence of tobacco.

We are assured, by the best authorities, that extreme vicissitudes and irregularity of seasons, great excess of cold, heat, moisture, or drought, are productive of disease; and that such variety of seasons cannot exist without producing corre-

sponding alterations in the composition of the atmosphere itself; but what these changes are, has never been explained, and, perhaps, never will be. The existence of electricity in the general mass of air which surrounds us, is acknowledged by every one; and to infer that this fluid, which is so wonderful in its effects, cannot exist in the atmosphere without a certain influence upon animal life, cannot be viewed as an unreasonable conclusion. The experiments and researches of modern philosophers agree in proving, that electricity enters into the composition of all material substances; and some suppose, with Mr. John Hunter, that " a subtile substance, of a quick and powerful mobile nature, seems to pervade every thing, and appears to be the life of the world; and therefore it is probable a similar substance pervades organised bodies, and is the life of those bodies." We see, in the course of our daily observations, the sympathies that exist between the brain and the stomach, and other parts of the body; the instantaneous effects sometimes produced by affections of the brain and nerves, manifested in what is called irritability; and we know that certain changes and modifications of fluids take place from certain affections of the vessels themselves.

Mr. Hunter has explained how a morbid state of the fluids may induce an unhealthy action of the vessels, and how the latter may reciprocally

occasion the former, supposing that the vital principle of the vessels, acting on that of their fluid contents, produces chemical changes by a concert of affection between both, which he has called "harmony." These notions at the time were considered obscure, but the experiments of Sir H. Davy, and of other modern inquirers, demonstrate the probability and rationality of his theory, and prove that there are electrical actions, by means of which all combinations and decompositions of matter are occasioned, and that what is called electricity pervades every substance, whether solid or fluid.

Dr. Macartney is also of opinion, that when fluids change their composition, it is often effected by means of some vital action in themselves, and not by a fermentative process, or mechanical operation of solids upon them, as is commonly supposed; and recent discoveries in science shew, that all the changes and motions which occur in surrounding bodies, as well as in those that live, are the effects of subtile and invisible principles existing in or acting upon them, and regulating and governing their temperature.

We see considerable vicissitudes in temperature from certain affections of the stomach, while respiration and circulation remain unaltered — a circumstance which can only be explained upon the principle of local nervous excitement, or torpor, or some similar affection of the vital

powers of the parts which undergo such transitions. This opinion is supported by Mr. Brodie's experiments, which prove that respiration and circulation may be artificially kept up, after all connexion between the brain, heart, and lungs, is cut off; but although the circulation was continued in these experiments for some hours, yet the body cooled as rapidly and regularly as that of another animal in which respiration and circulation ceased upon the division of the medulla spinalis. These experiments shew, that the change produced by respiration upon the blood is not of itself sufficient to maintain the ordinary temperature of animals, and that we must call in the aid of some other principle in order to account for the phenomenon.

Mr. Abernethy very justly states, that experimental science has not informed us of more than reason has suggested from the consideration of the general phenomena of nature,—that motion and changes occurring in surrounding bodies, and in our own, are the result of some subtile substance or substances which enter into their composition, or act upon them: and when Sir Isaac Newton explained the laws of attraction, and of the motion of those substances we call matter, he supposed that there might be an æther forming a bond of connexion and reciprocal action between their distant masses and molecules. However minute the atoms may be

which compose those visible and tangible substances called matter, Sir H. Davy's experiments shew, that each atom is surrounded by electric substances, possessing powers of attraction and repulsion, which are not only capable of acting upon the integral parts of bodies, but likewise upon the largest masses of matter. These electric substances produce decomposition and recombination, by which means the mechanical properties that before existed may be destroyed.

The agency of the electric fluid, and its existence in animated nature, have been fully proved by experiments upon the *gymnotus electricus;* and various other facts shew, that galvanic electricity is essentially connected with the human frame, and continually exerting its influence upon it. But a variety of causes may concur to vary the equilibrium of this fluid; and if we admit that a certain portion of it belongs to all substances, we shall find no difficulty in believing that any alteration in the quantity, quality, or intensity of its action, will produce corresponding changes in the habit or health of the body; and that the sensibility of the nerves, as well as many other disorders which we cannot satisfactorily account for, may be owing to the body possessing too great or too small a quantity of electric matter, which in fact may be the vehicle of all our feelings. We know that in damp and hazy weather, when the activity of electricity is diminished, our

spirits are languid, and our sensibility less acute. At Naples, when the southerly winds blow strong, the air is supposed to be completely deprived of electricity, and during its continuance the system is unstrung, and the nerves seem to lose their tension and elasticity.

Dr. Johnston observes, in speaking of the diseases of the Mediterranean, that during the strong southerly winds the circulating system in the human frame becomes wonderfully deranged; and according to Ritter, the electricity of the positive pole augments, while that of the negative diminishes, the actions of life: tumefaction is produced by the former, depression by the latter: the pulse of the hand (he says) held a few minutes in contact with the positive pole is strengthened, that of the hand in contact with the negative pole is enfeebled; the former is accompanied with a sense of heat, the latter with feelings of coldness.

From these facts and considerations, therefore, I am led to conclude, that either the absence of electricity from the human body, or some important change in its electrical state, arising, perhaps, from exposure to a negative electrical atmosphere, may be the cause of the dreadful and destructive epidemic which has recently ravaged the East; and that the vicissitudes of the seasons preceding this formidable visitation may support this opinion. If, then, this view of the subject be correct, we may readily account for the sudden attacks of

the disease; the change in the temperature and sensibility of the body, and in the fluids, which changes seem chiefly to characterise it; and for the manner in which it has been limited to some districts, extended to others, and has successively ravaged all.

How far this peculiar state of atmosphere and seasons in India may have influenced the change in the circulating fluid, to which I have ascribed the sudden death in cholera, is a question I am not myself prepared to answer, because I had neither the means nor the opportunity of collecting those facts that were likely to lead to correct information on this point. I suggested, however, to the Medical Board at Madras, in a letter to the superintending surgeon, Howard, dated Madras, 5th November, 1820, "That such an investigation might be attended with much advantage in tracing the cause of this disease."

I shall take leave, however, to observe in this place, that for the last four or five years my attention has been particularly attracted to the peculiarly thick and black appearance of the blood, in almost every case where I had occasion to perform the operation of venesection, whether in cholera, dysentery, fever, hepatitis, or rheumatism.* I mention rheumatism, because it was a

* According to this view, would not the inhalation of dilute oxygen gas, or of nitrous oxide gas, be attended with advantage in the treatment of these diseases? If the oxygen of the common air produces no change upon the Blood of what use would oxygen be even when in its pure state

case of this disease in which I was, in 1817, first struck with the black condition of the blood; which condition was particularly remarkable in that drawn by leeches: this fluid was generally more like *tar* than blood. This appearance, however, I imputed to the change which the blood is supposed to undergo in the stomach of the leech; and therefore passed it unnoticed, till my attention was arrested by its continual presence, whether the blood had been taken by means of venesection or of leeches, and by its nearly uniform occurrence amongst all classes of persons, of whatever description—from the most delicate female to the most robust and hardy soldier.

In the advanced state of epidemic cholera, the blood was so thick that it would not flow at all, but came away in large drops. At the very commencement only of the disease could blood be drawn; and even then it had the appearance of thick black oil. If, however, it flowed freely till the fluid became thin and of a bright red colour, the operation was generally beneficial, and the case became manageable; but of this more hereafter, when I speak of the treatment of cholera. In cases of disease of the liver, fever, and dysentery occurring during the period referred to, the blood flowed freely from the vein, though in a languid stream; but it was always thick and black. When leeches were employed,

and particularly when applied to the præcordia or head, they remained fastened to the skin for upwards of two hours, without drawing more than half an ounce of blood; and this, in general, was so excessively thick, that it could not be taken from them but with difficulty, and in some instances they died before they were removed.*

That this very unnatural and uncommon condition of the blood, which appears to me to be produced by an unusual accumulation of carbonaceous

* It has been observed to me, that the change which the blood undergoes in the stomach of the leech would account satisfactorily for its peculiar appearance; but this certainly is not the case: because, while I admit that blood there undergoes a considerable change, yet that change does not produce the peculiar thickened and inspissated state I allude to. The only difference I have observed in blood taken from the vein and by means of a leech, is in colour, and not in consistence. I have made the comparison frequently, and can therefore speak with confidence upon the subject.

The leeches at Madras are particularly large. The average quantity of blood which they bring away, deduced from an accurate admeasurement of what has been taken by many thousands, is about one ounce and a quarter each. Seeing that their services, therefore, can be so well regulated, I have always, in my own practice, applied as many leeches as would bring away a given quantity of blood, and ordered the bites to be stopped the instant the leech was removed. I would strongly recommend the same plan to be adopted by others, because I have seen very serious mischief arise from allowing the bites to bleed during the night; and there is sometimes more difficulty in stopping the bleeding from a leech than many people imagine.

matter, must lay the foundation for formidable congestive disease, cannot, I think, be disputed.

Carbon being a constituent element of the animal fluids, is carried to the lungs through the medium of the circulation in them, and is extricated from the system during the function of respiration, in the form of carbonic acid gas. Mr. Ellis observes, that "as the circulation declined or ceased, so likewise did the emission of carbon, and, consequently, the production of carbonic acid gas." This, I presume, implies that the freedom with which the chemical changes in the blood are effected depends entirely upon the state of the circulation; but, independently of the function of the lungs, which are the chief outlet for the extrication of carbon from the blood, we find this substance given off, though in comparatively small quantity, during the course of circulation, especially from the minuter vessels; and we know that it forms an important constituent of all the secretions.

The change of the bright florid arterial fluid into the dark-coloured highly carbonated venous blood, is confessedly operated in the capillary vessels; and it is reasonable to suppose, that the application of cold to the surface will check capillary circulation, promote the change in question, and thus heighten previously existing derangement both of the circulating fluid and of the moving powers of the body.

If the obstruction were continued, would the carbon accumulate beyond its natural proportion? and would the blood returning from the capillaries thus supersaturated with carbon, produce immediately deleterious effects in consequence only of this excess of carbonaceous matter? Or if such effects were not to take place, and if the blood be not readily returned from the capillaries into the large vessels, in what manner would the diminution of carbon be effected during the temporary stoppage of capillary circulation?

That either a diminished evolution of carbon from the blood, or an impeded absorption of oxygen into it,—(either alternative will suit my argument equally well),—actually has place in this disease, has been shewn by experiment. Dr. Davy analysed the expired air of the sick in cases of epidemic cholera, and found that it did not contain more than one-third of the carbonic acid usually contained in the breath of healthy subjects, two-thirds being retained in the blood.

Mr. Ellis says that, " If carbon be not emitted from the blood while yet in the large vessels, nor after it has ceased to be in motion, it must be given out by that fluid while in circulation, and after it has entered into the minuter vessels; thus it becomes an animal excretion, derived like other excretions from the blood, and emitted like them by some appropriate structure from the surface of the body. Hence any cause, as cold,

checking the circulation, restrains the production of carbon; or, although the circulation is not checked, the emission of this substance is prevented, by smearing the bodies of insects with unctuous matter, which, in consequence, causes death."

Whatever may have produced this change in the circulating fluid, and upon the excretion of carbonic acid from the lungs, which characterised the epidemic cholera, it is very certain that we have been unable to discover any sufficient cause for it, either in the weather or seasons of the year. The disease was known to prevail in hot, cold, wet, and dry weather, in dry and in wet situations, in low swampy countries and on elevated land, at all seasons, and under all cognisable circumstances. It must have depended, therefore, upon the influence of some quality in the atmosphere which has been overlooked, or which was, perhaps, beyond the reach of human observation.

It is a well-known fact, that in the very centre of extensive districts ravaged by epidemic cholera, there are certain narrow stripes or patches of country into which the disease has never penetrated, though all around was one scene of desolation.* This limitation of the disease to places

* The hill-forts in Kandeesh were exempt from cholera, whilst the disease raged throughout the country.

where there existed no natural obstacles to its extension, militates most conclusively against any idea as to its being a contagious disease, and seems to point to the existence of some difference in the quality of the atmosphere; and I have little difficulty in believing that difference to have been chiefly in its electrical state, which state may also have had an intimate relation with the exhalations proceeding from the soil of the places where the disease was predominant.

The general character of the invading symptoms of the disease favours this opinion: these symptoms more or less suddenly supervened, and the vital functions presented all the signs of some poison having been taken into the stomach, or infused into the blood. The effects produced upon the animal economy by the infusion of tobacco are indeed similar, in many respects, to a case of cholera; and it is a curious fact, that the appearances observed after death in the one case are not at all unlike those which have been observed in persons who have died from the effects of this or of any other violently narcotic poison, as the poison of the cobra de capello, &c.

I regard epidemic cholera, therefore, as essentially an affection of the nervous system, and consider the diminution of the nervous power to be the proximate effect of the efficient cause of the disease — that cause being the electrical condition of the air, arising from, or accompanied by,

terrestrial exhalations of a kind unfavourable to animal life. That the depression or affection of the nervous influence soon affects the blood, appears evident; and that the black unoxygenised state of this fluid heightens the previous derangement, and leads to the extinction of life itself, seems equally probable. That the circulation of black blood produces this effect, has been shewn by Dr. Goodwin, who states, with seeming propriety, that " when the pulmonary blood is no longer fitted to excite the sinus venosus and auricles to contract, they receive it into the cavity, and remain at rest." But whether we agree with Dr. Goodwin and others, that the blackness of the blood consists in its unoxygenised state; with Ellis and others, in an excess of carbon; or with some physiologists, in both these states combined,—still its effect upon the action of the heart and upon the brain will be the same; and death or extreme debility, &c. will be the uniform result of the presence of venous blood in the left cavities of the heart and in the arteries. Therefore the phenomena of the advanced stage of cholera (as well as those arising from any other causes impeding the changes produced on the blood by respiration,) may be considered to proceed chiefly from the presence of black blood in the heart and arterial system, blood of this colour being found in these parts.

In epidemic cholera the circulation at the

wrist soon ceases, but the pulsation in the carotid artery can be felt till a few minutes before death, and for some time after it ceases at the wrist; shewing that the blood is carried to the brain till the last moment of life. We may, therefore, infer, that death in this disease is occasioned in the same way as in drowning, *i. e.* owing to black venous blood being sent to the brain, and destroying its influence.*

From all the foregoing considerations, I conclude that the constitution of the atmosphere to which I attribute the disease — whether that constitution consisted of a change in its electrical conditions, or in the presence of certain unusual emanations from the bowels of the earth — greatly depressed, and consequently impeded, the vital and nervous functions; and owing to the intensity of this mode of operation, and, perhaps, to the co-operation of the exciting or occasional causes, thus tended to the destruction of the lives of those predisposed to its influence, giving rise, during the processes of its operation, to the phenomena characterising the malady.

* The patients, however, in general retain their senses to the last, although there are always drowsy and stupid appearances about them: the eyes are generally turned or drawn up in their orbits, and are half open, shewing only their white part; but whenever I could get a full view of the eyes, I observed that the pupils were much dilated.

SECTION II.

Of the Predisposing, and of the Exciting or Occasional Causes.

Although we are unacquainted with the nature of the exhalations producing intermittent fever, and are even unable to detect them in the atmosphere by any chemical test, still it is very important to know in what situations they are generated. In treating of the cause of epidemic cholera, it is likewise important to point out the situation and circumstances which experience has proved to be somewhat favourable to the development of this disease. And here I may at once state, that there seems to be sufficient proof that the situations remarkable for the prevalence of intermittent and remittent fevers, are favourable to the action of the efficient cause of the disease upon the system, if not to the development of the cause itself.*

It has been customary to assign a variety of efficient as well as of predisposing and occasional causes to this disease; nor can it be denied that

* At Sindwa and Candeesh, the disappearance of cholera was succeeded by severe cases of remittent and intermittent fevers, and those who escaped the former frequently fell victims to the latter.

a state of derangement, very nearly resembling epidemic cholera, is produced by many deleterious substances—for instance, tobacco; but I am disposed to consider an unknown morbific condition of the atmosphere, or, as Sydenham would have called it, a choleric constitution of the air,—whether that constitution result from its electrical state, or from the nature of the terrestrial exhalations existing in it,—to be the effective cause, without which the epidemic form of the disease could not have existed; and whatever favours the action of this cause, I consider to belong to the predisposing and occasional causes only.

This morbific condition of the atmosphere, whatever may be its nature, appears to be powerfully debilitating or sedative. All that, therefore, either directly or indirectly weakens the body, will diminish its power of resisting this sedative agent; and will consequently prove a predisposing cause of the disease. As this condition of the air, however, eludes our senses, it is no wonder that the more obvious predisposing and occasional causes, such as hunger, fatigue, intoxication, cold, &c. &c. should have been often regarded as the true causes of the malady. But as in former times (*i. e.* before 1818), and under circumstances perfectly similar, neither cold, hunger, fatigue, nor intoxication, produced the disease, they cannot be considered in any other light than

as concomitant or exciting causes, or as favouring the action of that cause upon the system without which the epidemic disorder could not exist. They merely aid the action of such a noxious power by diminishing the resistance which the system can oppose to its influence. Much of the modification which the disorder assumes, as respects both its violence and prevalence, may be easily explained by inferring a variation in the intensity of the actual cause of the epidemic, and in the degree of predisposition of the patient, or of his vital resistance to its effects.

On this supposition we may easily explain all the occurrences which, at first sight, seem to favour the doctrine of contagion. Troops were attacked whilst marching, because the fatigue, privation, and variations of temperature to which they were exposed, produced the necessary predisposition, and often proved the exciting cause of disorder; while the inhabitants of the country who were not so predisposed were enabled to resist a cause of no great intensity. When, however, the immediate cause was more intense, the inhabitants, though they resisted it longer than the predisposed troops, still ultimately suffered. This accounts for the occurrence of the disease in many villages of the Ceded Districts, and in those between the river Kisnah and Hyderabad, after the troops among whom it prevailed had marched by or through those countries. Several reasons

might be assigned for the cases which sometimes occurred among the troops at stations, soon after the arrival of corps or detachments in which cholera had prevailed. It is, I believe, a well-known fact, that European soldiers, on arriving at a new cantonment or garrison, almost invariably get drunk. The debility consequent upon such a practice may be considered a predisposing cause; and if natives do not indulge in spirituous liquors to the same extent as Europeans do, they have recourse to excesses equally debilitating.

The attack of one detachment, and the escape of another, while marching by the same route and nearly at the same time, may probably be explained by considering the length of the journey which each had previously performed, the internal economy of the corps to which these attacked respectively belonged, and the degree of salubrity of, and the price and quality of provisions at, the stations through which they had marched.

But it may be said, that predisposing are sometimes convertible into exciting or occasional causes of the disease; nor will I object to the general proposition: nevertheless, I am still of opinion, that there must be some morbific condition of the atmosphere, whatever that may be, without which the disease cannot exist, and which has no necessary relation with the other

classes of causes, farther than what may be occasional and fortuitous, although often concomitant.

But whatever state of atmosphere produces the malady, or whatever predisposes the system to its invasion, I am decidedly of opinion, that sudden exposure to cold is its most common exciting cause, owing to the check which it gives to capillary circulation on the external surface of the body.*

With respect to the influence of particular kinds of seasons, of the states of the weather, and atmospherical vicissitudes, as predisposing and exciting, or as efficient causes of epidemic diseases in general, and of epidemic cholera in particular, much difference of opinion exists. But although I consider that such states of the seasons in India may act either as predisposing or exciting causes, according to circumstances, yet I cannot conclude that such seasons should be considered as the efficient cause of epidemic cholera, seeing that this effect has not, on other occasions, been observed to follow the imputed cause; and seeing that such a cause is inadequate to produce the effect in the manner in which it has recently been observed in India; and moreover, because, granting that the con-

* It is chiefly to the circumstance of females and children not being so much exposed to the predisposing and exciting causes of the disease, that they are less frequently attacked with it than male adults, whose exposure to both is much greater.

dition of the air which I have inferred to be the cause of cholera, actually existed, the state of the weather may be considered as having been partly modified by that condition — unless, indeed, that condition resulted from the peculiarity of the season. I am, therefore, induced to consider the states of the seasons that are hereafter described to have been merely predisposing or exciting causes, according as such states and vicissitudes of the weather may have occurred and as fortuitous or concomitant circumstances only, on which we can place no just value with respect to their agency on epidemic diseases generally, and on epidemic cholera more particularly.

With respect, however, to the influence of season and weather on certain diseases, we have a sufficient share of authority, if we have not satisfactory proof. Lord Bacon says, " If the south wind blows for a continuance, with a serene sky, without rain, it is very pestilent; for it is during the blowing of the south that pestilential diseases spread."

Dr. Short observes, that " long-continued sultry weather, whether the wind be southerly, or long still and calm, gives life and vigour to putrid, malignant, and pestilential fevers."

Dr. Rutty is of opinion, that extreme vicissitudes are more prejudicial than any quality of the weather long continued. He remarks, that

"Whenever we observe the usual harmony and proportion of the winds and attendant weather to vary much, we may expect an unhealthy season; as was notoriously the case in the excessive moist seasons receding the great frost in 1740; and the no less unusually dry season, and long continuance of the north-east winds, which succeeded the great frost for some years."

Huxham confirms the observation in reference to England: he says, "We very seldom see severe and pestilential fevers become very general, except after some remarkable peculiarity of the atmosphere." Hippocrates remarks, "that when the seasons do not observe their accustomed course, the diseases will be unusual and anomalous; and that great vicissitudes, either of cold or heat, are unhealthy:" and Ammianus Marcellinus says, "Philosophers, as well as illustrious physicians, have recorded, that pestilence arises from great excess of heat or cold, or drought or moisture."*

There can be no doubt that very unusually disturbed seasons prevailed at Madras and its dependencies for several years previous to the appearance of cholera; but the want of precise information as to this matter beyond my own personal observation, which can only apply to the particular part of the country in which I was

* Hancock on Pestilence, pp. 302–4.

stationed, prevents me from entering into any detailed consideration of this subject.

I shall merely observe, in general terms, and in a few words, that the years 1815-16 were extremely hot. Strong southerly and westerly winds prevailed, and very little rain fell. The highest range of the thermometer in the shade, at Madras, was 104°, and the lowest 66°.

The year 1817 was extremely close, with variable winds, chiefly from the south and west, and a very great fall of rain, with thunder and lightning. The highest range of the thermometer was 99°—lowest 66°.

1818 was similar to the preceding year. There were excessively heavy falls of rain, continuing from July till January; a great deal of thunder and lightning, and a severe hurricane in October. The greatest range of the thermometer was 103°, the lowest 68°.

1819 was variable, the weather extremely hot, and westerly and southerly winds prevailed, with less rain than during the preceding years. A smart shock of an earthquake was felt at Wallajaahbad, about forty miles from Madras, in October; and in the early part of the year, shocks of earthquakes were felt at Calcutta, Bombay, and at various other places in Hindostan. The greatest range of the thermometer was 100°, the lowest 68°.

1820.—The weather was extremely irregu-

lar; frequent and heavy gales were remarked, and thunder and lightning extended over the greatest part of the peninsula. More rain fell during this year than in the preceding. The highest range of the thermometer was 98°, lowest 69°.

1821-22-23 were close, hot, sultry, and oppressive years. There was very little rain, but strong southerly winds prevailed, which scorched, like fire, the trees and grass over which it blew.

It appears from Dr. Jameson's work on Cholera in Bengal, that for some years before the epidemic cholera made its appearance, they had excessive heavy rains, great droughts, storms, and earthquakes: he says, "that the changes which have taken place in the course and succession of the seasons within the last few years, in every part of Bengal and its dependencies, have been so striking, as to have not only attracted the notice of attentive observers, but to have become a frequent topic of conversation." Bombay doubtless has partaken, in common with all other parts of India, in the general vicissitude and irregularity of seasons; and I imagine there can be little doubt that this irregularity of seasons has been in some way connected with that condition of the air to which I have imputed the epidemic; and if the latter has not produced the former, the concomitance of the two conditions is worth attending to, and their co-existence as causes,

either of one kind or another,—the one determining or exciting the influence of the other. There can, however, be no doubt, that some more unusual and more extended cause than the state of the seasons, or of the atmospherical vicissitudes just referred to, must have existed then, that did not previously; for we have witnessed, at former epochs, similar seasons and atmospherical vicissitudes to those now alluded to, without observing corresponding results arising therefrom; and we have seen the same excesses, the same privations, the same labour and exposure, in every degree, practised with perfect impunity till the year 1817.

It is a singular fact, that while this epidemic raged in India during the years 1817, 1818, and 1819, there was also great sickness over almost the whole of Europe — a circumstance which favours the opinion I have endeavoured to establish, namely, that its efficient cause is one evincing more general relations, as well as a more intense mode of action, than can be assigned to mere vicissitudes of season.

Before I leave this subject, I shall place before the reader an abstract of the meteorological observations made at Madras from 1815 to 1820, including these two years.

Mean Temperature at Madras. (Goldingham.)

Years.	January.	Feb.	March.	April.	May.	June.	July.	August.	Sept.	October.	Nov.	Dec.
1815	75·00	79·80	80·00	88·60	92·25	85·90	84·80	86·60	86·10	82·35	77·75	76·75
1816	74·75	75·15	78·05	81·00	89·75	89·90	86·05	84·45	83·90	83·50	80·55	76·75
1817	75·90	77·50	80·00	82·70	89·00	88·60	88·50	86·65	83·80	82·75	77·65	79·25
1818	77·70	79·85	79·70	84·00	91·90	90·55	84·00	81·50	85·00	82·75	78·50	77·00
1819	73·20	76·25	79·80	83·85	89·85	91·00	88·00	88·25	84·75	84·00	81·50	78·25
1820	75·70	78·40	79·65	85·40	86·10	88·30	87·40	86·50	85·25	85·00	81·37	78·90
General Mean	75·375	77·825	79·53	84·258	89·808	89·041	86·458	85·658	84·8	83·391	79·55	77·81

Mean Temperature at Calcutta. (From Jameson's Report.)

68°	76	79	84	86	81, 2, 3	During the rainy season, which commences about the middle of June, and terminates about the middle of October.	74	70
Range 47 to 75	65 to 82	73 to 86	78 to 91	81 to 93	77 to 90		66 to 86	56 to 78

Mean annual fall of rain at Calcutta, 70 inches; at Madras, 54 inches.
Mean annual fall of rain at Martinico, 100 inches; at Demerara, 80 inches. (Chisholm.)

1815.

	Barometer.		Therm.	Rain Gauge. Inches. Observed.	Reduced.
General mean	29·922		83°		
Greatest height	30·200	May	104·5	220·8	55·2
Least height	29·700		66·2		
Extreme difference	·500		38·3		

1816.

General mean	29·974		82°	Observed.	Reduced.
Greatest height	30·228	May	100·7	158·5	39·6¼
Least height	29·720		66		
Extreme difference	·508		34·7		

1817.

General mean	30·001		82·7	Observed.	Reduced.
Greatest height	30·300	May	98·5	254·8	63·7
Least height	29·725		66·8		
Extreme difference	·575		31·7		

1818.

General mean	29·943		81·9	Observed.	Reduced.
Greatest height	30·240	May	103·8	308·8	77·2
Least height	29·276		68·2		
Extreme difference	·964		35·6		

1819.

General mean	29·951		83·2	Observed.	Reduced.
Greatest height	30·220	June	100	109·8	27·45
Least height	29·600		64		
Extreme difference	·620		36		

1820.

	Barometer.	Therm.	Rain Gauge.	
General mean	29·96084	83·164	Inches. Observed.	Reduced.
Greatest height	30·238	May 98·2	277·1	62·275
Least height	29·560	69·2		
Extreme difference	·678	29		

The medium height of the thermometer for five years before the year 1815 was 83·8; the medium height for the five years from 1816 to 1820 inclusive, was 82·6; the difference nearly a degree and a quarter. Mean annual range 34°.

The medium height of the barometer for the first five years, and that for the last, were exactly the same, being 29·96 inches. Mean annual range, 640.

The mean monthly temperature, from the beginning of 1815 to the end of 1820, had been in January, 75·3; in February, 77·8; March, 79·5; April, 84·2; May, 89·8; June, 89; July, 86·4; August, 85·6; September, 84·8; October, 83·3; November, 79·5; December, 77·8.

CHAPTER V.

OF THE TREATMENT OF EPIDEMIC CHOLERA.

Having stated, as fully and distinctly as I am able, the history and symptoms of epidemic cholera; having inquired into its pathology and its causes,—it now remains for me to treat of that particular part of my subject to which the foregoing is preparatory and entirely subordinate. It is to the more satisfactory treatment of this destructive malady that all our inquiries ought ultimately to aim; and such inquiries, however foreign they may appear to this important object when looked at superficially, if they in any way, or however indirectly, tend to its advancement, cannot be considered as being either unnecessary or unprofitable.

In order to bring this subject — more especially as it respects my own experience — before my readers, in as detailed and precise a manner as I can, I shall first give a general view of the treatment, with particular observations on some of the most efficient means which were usually adopted; and I shall, secondly, detail several cases, illustrating the effects and utility of the particular measures which were resorted to, and recommended for the cure of the disease.

SECTION I.

General Sketch of the Treatment of the Disease.

It is only by means of a distinct view of the nature of diseases that we can ever hope to be successful in the treatment of them. This object can only be acquired by close, attentive, and unbiased observation at the bed-side of the patient, where not merely the various changes which take place in the course of disease should be carefully noted, but where, also, the peculiar effects of each remedy should be narrowly watched.

For the treatment of epidemic cholera, I have always endeavoured to keep in view, as far as was within my power, the cause of those urgent and distressing symptoms which never failed to excite alarm, and to mark the disease. These symptoms generally assume the appearance of those of extreme debility, whilst oppression of the vital powers is the real cause; if, therefore, the disease be treated as one depending upon debility alone, without attempting to remove oppression, the practice will be at least uncertain, and in general unsuccessful.

Examinations of the bodies of patients who have died of epidemic cholera prove incontestably that the system has been oppressed by venous congestion, and that the general disturbance of

the constitution has arisen from this cause. The various changes which take place in the circulating fluids early in the disease, may probably arise from its effective cause abstracting vital power, acting thus as a specific poison, and destroying the balance of circulation. Hence the blood is imperfectly propelled to the surface of the body, accumulates in an unusual quantity in the right cavities of the heart, in the large venous trunks, and in the lungs, and, owing also to its high state of carbonisation, or defective state of oxygenisation, overpowers the remaining energy of the heart and lungs, and deprives them of the power of performing their functions with regularity. The lungs being thus oppressed and overloaded, have not the power of oxygenising (or decarbonising) the blood, and hence black blood is returned to the left auricle and ventricle of the heart, which, being deprived of their natural stimulus, cease to act with their usual energy, and consequently the circulation in general becomes languid. If this view of the subject be correct, the indications of cure will be self-evident: to remove oppression from the venous system, and restore the balance of the circulation, are the chief objects we should propose to accomplish.

Bleeding, therefore, when it can be effected, should never be lost sight of. The object of resorting to it, is to diminish the quantity of this

fluid, in order to relieve the heart and lungs from oppression, and to enable them to perform their functions.

This object, however, can only be attained in the early stage of the disease, and before the circulation ceases at the wrist; the necessity, therefore, of early assistance is manifest, because after this period blood will seldom flow from the veins, and when it does flow, it is generally in too small a quantity to afford relief. I have sometimes seen sixteen, eighteen, and even twenty ounces flow languidly, and in a very thick stream from the veins, then the bleeding stop suddenly, and the patient sink at once. I have considered that in these cases the quantity of blood thus taken was merely that which had remained in the veins after their circulation had been arrested, and that the bleeding ceased as a matter of course when the veins were emptied. This circumstance has led to various opinions upon the propriety of bleeding, and has induced some to infer that death was accelerated by it. I do not mean to deny this fact; but I conceive that the disease was then so far advanced, that death would have been the consequence under any circumstance, and that this issue was only hastened, probably, half an hour or an hour by the operation.

We have instances, however, wherein blood, drawn even in the advanced stage of this disease,

has continued to flow till the balance of circulation was restored, and the patient has recovered.

In these instances the blood was at first thick, black, and came away in drops; at length it became thinner, and flowed with more ease, till the colour changed to a bright red. This is the change which should always be looked for, and whether it take place after the abstraction of one ounce or thirty, is of no consequence; this change must supervene before the patient can be considered safe. Under all circumstances, therefore, I think we should never forego a trial of the lancet.

That cases have occurred wherein eighteen or twenty ounces of blood have been taken away, and the patient has died, cannot be doubted; but in all these cases it will be found that the bleeding ceased after the vessels had been emptied, whether one or twenty ounces had been abstracted. On the other hand, it will likewise be found, that if blood flows freely till the colour changes from black to red, the patient, in general, will recover. When we observe, therefore, the thick, black, carbonated blood change to a natural red colour, and consequently to a thinner consistence, we may rest satisfied that the disease is under our control.

I saw a very striking instance of this fact in the case of a young lady at Madras, who was attacked with cholera. The symptoms were decidedly marked, and the usual remedies were applied. The pulse was fluttering, and seemed

oppressed. I ordered a vein to be opened, and gave particular direction to the gentleman who was in attendance with me, and in whose observation and judgment I had the fullest confidence (Dr. Archer), to let the blood flow till its colour changed from black to red, without reference to quantity. At first it came away only in drops, and was exceedingly thick and black. Warm flannels were applied to the arm, and in a few minutes the blood began to flow more freely, but still in a very languid stream. After three or four ounces had been taken, the colour changed, and it flowed with perfect freedom; the pulse got up, became more regular and soft, and although not more than eight ounces were taken, the patient recovered rapidly.

Although I recommend bleeding to be attempted at all times, and in every stage of the disease, I am fully aware that many cases have recovered where it has not been used at all; nor do I answer for its universal success: but I do venture to assert, that if it can be accomplished in the early stage of the disease, and before the circulation has ceased at the wrist, in nine cases out of ten it will prove successful, especially if the colour of the blood change from black to red, if the pulse get up, and the spasms be relieved.

In confirmation of this opinion I cannot do better than detail a circumstance bearing upon

it, which occurred at Madras in 1821, and which has been already alluded to, (see page 23.)

The General Harris East Indiaman arrived at Madras on the 20th June, 1821; her crew were in perfect health, and had been so during the passage from England. On the 27th June, epidemic cholera made its appearance amongst them, and raged with great violence. Captain Welstead, and Mr. Colledge, surgeon of the ship, called upon me at the general hospital, to consult upon the best means of curing, as well as preventing the disease.

I stated my views fully upon this subject to Mr. Colledge, and the line of future treatment was decided upon. This gentleman was unremitting in his attention to the men under his charge, and whenever he observed any of them depressed and low-spirited, he at once inquired into their feelings, and without a moment's hesitation took from twenty to thirty ounces of blood from the arm, gave ℈j. of calomel with two grains of opium, and sent them on shore well wrapped up, to the general hospital under my charge; and the subsequent disease shewed what might have been expected from less energetic measures.

The disorder being thus checked before it had made any great invasion upon the constitution, was, when brought before me, in a manageable state, and I looked forward with confidence to a successful termination of it in almost every instance.

Upwards of fifty men were landed from the General Harris Indiaman, labouring under the disease, and sent to the general hospital; and it is with peculiar satisfaction I can say, that the whole number returned in health to that ship before she left Madras Roads.

Under the best management and greatest advantages, the fate of a patient with cholera is soon decided; even if we succeed in conquering the first attack, the stage which follows is of equal importance, and requires not only great attention, but great resources, which few trading ships, however well supplied they may otherwise be, can command.

For this reason the men were landed from the General Harris, and sent to the general hospital at Madras. It is impossible they could have been placed in abler hands than those of Mr. Colledge; but with all his zeal, humanity, and professional tact, without the resources which belong to a general hospital, it would have been out of his power to have done the men justice. I mention this as much with a view of shewing the necessity of landing men so circumstanced, as to point out the propriety of adopting similar measures of cure on any future occasion.

The following facts connected with this detail, will throw additional light upon the subject:—

Nearly all the men who were attacked with

this disease on board ship, and who were not bled, or from whom blood could not be drawn, died. Many of those who were bled and who derived benefit, but whose subsequent treatment could not be closely watched, from want of means, also died. Those men who were bled, and sent to the general hospital at Madras, where they could receive every attention, and had every means of accommodation, recovered.

I enter more fully into these circumstances, with a view of giving the practitioner confidence in his attempts to cure the disease, and at the same time to give that credit which is justly due to Mr. Colledge, whose prompt, decided, and judicious treatment of one of the most destructive diseases that has ever visited the globe, deserves the highest praise. I am perfectly persuaded, that if he had not paid the closest attention to the invading symptoms of the disorder, and acted in the most decided manner, many of those lives which have been preserved, would, under other circumstances, have fallen a sacrifice; and I feel great satisfaction in having the opportunity of bearing testimony to the zeal and merits of this gentleman.

Whilst I consider bleeding to be the sheet-anchor in the treatment of this disease, it must not, at the same time, be imagined that this alone will cure it. There are other aids equally

essential. The object of bleeding is to remove spasm and venous congestion; to relieve the heart and lungs from oppression, and to check the most urgent and distressing symptoms; and unless this be in some measure attained, all our efforts will prove fruitless: but this having been once accomplished, the disease is brought into a manageable state, though it not unfrequently happens that the most active agents are afterwards required to remove a very opposite state of the disease, nearly as dangerous as the former, occasioned by the re-action which occurs, under a state of system unfavourable to its development.

I have thought it right to discuss thus fully the advantages of bleeding, because I know there is, among many of the profession in India, a very great prejudice against it. My own experience is decidedly in its favour; but it is not always that we can see patients in time to secure its good effects. In such cases we must have recourse to other measures, as antispasmodics and stimulants.

Opium.—Opium has been recommended, and generally used, in large quantities; but I have seen very little good arise from it; on the contrary, I have often thought that there was commonly a greater determination to the brain, and a much greater degree of stupor, where opium

had been given and depended upon, than where it had not. On this account I very early discontinued its use, and latterly never gave it under any circumstances in epidemic cholera, except in combination with calomel. In general I used camphor, ammonia, and æther, in the following form: —

℞ Mist. Camph. ℥jss.
Aquæ Ammon. ♏xxxv.
Sp. Æther. Vitriol. ʒij.
M. ft. mist.

A dessert-spoonful of this was given every ten, fifteen, or twenty minutes, according to circumstances.

Rubefacients.—I have always used, with decided benefit, spirits of turpentine as an embrocation, for spasms of the extremities, &c. &c.; and I have applied sinapisms to the legs and soles of the feet, and sometimes covered the whole trunk with them, from the clavicle to the pubis. I have also applied blisters occasionally; but I think sinapisms act more quickly and more certainly on the skin, and for this reason I have generally resorted to them in preference.

It was not at all uncommon to see these applications fail altogether in producing any effect upon the skin; and in many cases, even where an effect was produced by blisters, there was nothing like that healthy discharge which we see proceeding from them in common diseases.

Warm and vapour-bath. — The warm bath, I am of opinion, did more harm than good in epidemic cholera. The fatigue arising from going in and coming out of it, and from rubbing and dressing the patient, exhausted him; and when neither rubbing nor dressing was attended to, and when the patient was at once taken out of the bath and wrapped in blankets, I think mischief was done by the blanket, thus moistened, being kept upon him. I never resorted to this treatment in cholera above two or three times, and subsequently not at all.

The vapour-bath is better adapted for this disease, if the heat could be regulated; but it cannot, as used in India, and it is both too sudden and too intense. I have never seen any advantage obtained from it in this disease.

A well-regulated sand-bath might be exceedingly useful; but I am not aware that it has ever been tried.* I have found infinitely more benefit arise from the application of warm dry flannels to the surface of the body, than from any other application of this description; and it was the remedy invariably used in my hospital, after I

* Major-General M'Cauly informed me, that when cholera prevailed in India in 1780, 81, and 82, that a bath of hot grain answered better than any other. Some of the native doctors say that they have cured the disease by rubbing the whole surface of the body, on the breaking-out of the excessive cold perspirations, with a hot absorbent powder, consisting of calcined shells.

had satisfied myself of the inutility of the warm and vapour-baths.

Nitric-acid blister.—A nitric-acid blister has been strongly recommended, and I have given it a full trial. It produces severe smarting of the skin, but I have never, in any instance, seen vesication produced by it. Whenever the acid acted upon the skin, it always made an *eschar*, but raised no blister; I had consequently no confidence in it.

Boiling water.—Scalding water has been recommended as a blister. I certainly think it more likely to be useful than the nitric acid. I have heard of good effects being produced by it, but have never used it myself.

Of all the foregoing applications, I have depended most upon the common blister, the mustard poultice, and the warm flannel applications.

The following is the way in which this disease has usually been treated under my direction:—

A patient is admitted into the hospital, I shall say at noon, with all the symptoms of cholera; a vein is immediately opened, and one scruple of calomel and two grains of opium are given in the form of a pill, and washed down with the camphor draught. The body and extremities are well rubbed with dry flannels made warm, and bottles filled with hot water are applied to the feet and hands; but if the spasms are severe, spirits of turpentine are used as an embrocation.

In an hour we generally perceive the effects of these remedies, and whether the disease be in any degree arrested, or be proceeding in its progress. If the former, nothing more is to be done till evening, when the calomel pill may be repeated, and an enema exhibited. The following morning the bowels should be again fully evacuated, and then the patient may be considered safe.

When blood, however, cannot be drawn from the arm, and the spasms continue ; when severe pain and burning heat are felt at the umbilicus and scrobiculus cordis, and are distressing ; when the skin is cold, and deluged with cold clammy dew ; and when there are oppression in the chest and difficulty of breathing ; excessive pain and confusion about the head, with great intolerance of light ; no pulse, or a pulse scarcely to be felt ; and a cadaverous smell from the body,—twenty or thirty leeches should be applied immediately to the umbilicus and scrobiculus cordis, the calomel pill should be repeated, and the turpentine embrocations continued. Leeches ought likewise to be applied to the temples and base of the skull.

When the leeches bleed freely, the application of them is always attended with decided advantage, and they should be allowed to remain till they have fulfilled their duty ; after which, a large blister or sinapism should be applied over the whole abdomen. Sometimes the

leeches fasten, but do not draw blood. In this case they should be removed immediately, and the sinapism or blister applied in their place. When the bowels are very irritable, and constantly discharging a watery fluid, small anodyne enemas, with camphor, may be given; and the drogue amère, a nostrum used by the Jesuits, will be then found very useful in assisting the operation of calomel, which latter should always be repeated every two hours, till three or four scruples have been taken.

Whenever we fail in checking the disease at first, we have no resource but to treat urgent symptoms, and they must always be met with decision as they occur. The patient ought never to be left a moment without an attendant who is capable of acting according to circumstances, and who may take advantage of every change.

An opportunity sometimes offers in the advanced stage of the disease to abstract blood: this is indicated by a struggle or effort of the circulating system to overcome some resisting power, and is a most auspicious symptom, which should never be overlooked. This re-action indicates that the constitution is making an effort to restore the circulation, but is unable to do so till assisted by the abstraction of blood, which abstraction aids in removing that oppression which it has not power of itself to overcome. This is a

point in the treatment of epidemic cholera, of the greatest importance, requiring both tact and judgment; but the change in the circulation, indicating the propriety of adopting and the time of performing it, should always be expected and taken advantage of as soon as it occurs.*

In this manner the treatment proceeds, sometimes with evident signs of success, at others without the least impression being made upon the disease. A very few hours, however, will frequently develop what we ought always to hope for, and even to expect, viz. a favourable change. This is always accompanied by relief from the bowels, in the form of a blackish, gray, feculent, and tenacious discharge. Whenever this takes place, there is hope, and the exhibition of calomel should be followed up by a smart purgative, if the stomach will receive it; if it will not, an enema should be administered, and repeated till motions are procured. The purgative

* The case of my friend Captain M——— is very illustrative of the above remarks. He was seized with cholera, and had taken the cholera dose of op. and cal. When I was called in, he complained of severe pain in the bowels, difficulty of respiration, great irritation, and a hurried, feverish pulse. I raised him up in bed, and bled him profusely, till his pulse became regular, low, and tranquil. During the operation, he continued to repeat, "Oh, this is delightful, this is delightful! You have saved my life." In two days he was quite well.

I have generally found to answer best at this stage of the disease, and to sit most lightly on the stomach, is the following draught: —

℞ Pulv. Jalap. Comp. ʒss.
Aq. Menth. Pip. ℥ij.
M. ft. haust.

And, as it is a matter of the very first consequence to act upon the bowels freely as soon as possible, if this draught have no effect in two or three hours, it should always be repeated.

Urine is neither secreted nor passed during the continuance of the disease; whenever it appears, which it frequently does, with a full and free discharge from the bowels, the occurrence is always favourable.

Twelve or eighteen hours generally terminate this disorder either one way or the other; but when we succeed in subduing the violence of the attack, the greatest attention and care are required to preserve the patient against the effects of that general disturbance which the constitution has suffered. The whole system is shaken to its foundation, and the organic functions are so deranged, that I have known instances of men lingering in bad health for many months, while every care was taken of them, although they had been perfectly well to all appearance not many hours before the attack; and indeed I have seen some who have not recovered, and never will recover, from its effects.

The subsequent treatment is now to be considered; and the indication in this stage is to guard against congestion in the abdominal and thoracic viscera, and in the brain, some one of which suffers in a greater or less degree; and occasionally the whole are attacked at the same time.

There are generally observable in the advanced stage of the disease, an unusual stupor and heaviness of the patient, and at times an obstinate sullenness that is exceedingly annoying; because, when these symptoms are present, it is with the greatest difficulty we can get answers to questions, and consequently we often act in the dark, from the want of information beyond what is derived from observation, which will not serve us upon all occasions. Patients affected with these symptoms seldom complain of much pain; but, on examining the abdomen, a very great fulness, and a doughy feel, are generally found all over it, as if the intestines were completely overloaded, and the viscera enormously congested: pressure made upon the liver obliges the patient to shrink from it, and to shew symptoms of uneasiness, though they often positively and obstinately assert that they have no pain.

The eyes are sometimes peculiarly bright, with contracted pupils, and there is an evident intolerance of light; yet these patients insist that they have no uneasiness in the head, and that they can look at the light with perfect ease.

The pulse is often oppressed and labouring, notwithstanding a very large quantity of blood may have been taken during the first stage of the disease.

These are symptoms that require immediate attention, and, when urgent, blood should be taken from the arm; but in general, leeches will answer every purpose, and I consider them a safer remedy in this stage of the disease than general bleeding; because they appear to me to empty the capillary vessels, and aid in regulating the circulation, without destroying power—a point of great importance where the constitution has already suffered so severely.

This practice may appear too bold to some who have not observed the frequent or decided adoption of it in this disease; and more particularly to those in India, who have a deep-rooted dislike to depletion of any kind, under the mistaken notion of its producing debility, and who do not discriminate between direct debility and oppression. The practice, however, has been proved, by no limited experience, to be singularly successful in the cure of this disorder. But the symptoms rendering it necessary require a most watchful and discriminating eye, because they are seldom complained of by the patient; and I know that there are many who rest perfectly satisfied with the answers they receive, without making further inquiry, and who have

often been surprised when they have unexpectedly found dangerous symptoms succeed a favourable report, after a lapse of not more than an hour or two. A minute examination of the patient, therefore, is particularly necessary in the treatment of epidemic cholera—a malady in which the sensibility appears to partake largely of the general disturbance of the system, and where the patient seems to be perfectly indifferent about his fate. Watchfulness and discrimination, therefore, are evidently of so much importance, that I cannot urge their adoption to the practitioner in terms too strong.

When the patient shrinks from pressure on the abdomen, leeches should be placed over it in considerable numbers, and particularly in the neighbourhood of the liver; and when the head is affected, they should be applied at the temples and base of the skull. I prefer the latter situation; and I think I have observed greater advantage to arise from their application on this part, than when placed on the temples.

Purgatives should, as a matter of course, be used in aid of the above remedies; but the congestive symptoms ought to be overcome before we can adopt any regular plan of treatment to re-establish the general health.

Whilst these symptoms of oppression and congestion require the most minute attention, we must not lose sight of the state of the alimentary

canal, of the secretions of the small intestines, and of the alvine discharges.

Though the irritability of the stomach sometimes continues till a very late period, yet in general it is subdued early, and that organ retains all that is taken, both as medicine and nourishment: but as the small intestines exhibit, on dissection of fatal cases, a most peculiar appearance, from the duodenum to the cæcum; as they are very much contracted in their diameter, thickened and pulpy in appearance; and as they are, when laid open, found filled with a cream-coloured, thick, viscid, and tenacious matter, exactly like old cream-cheese, which obstructs their canals; and, moreover, as this matter is to be found in every fatal case of cholera,—so it may be inferred to exist in some degree even in all that recover; and therefore the removal of it must be a primary consideration.

Purgatives do not seem, however, to act upon this matter at first, for they merely produce watery dejections; so long, therefore, as these continue, we may be sure that all is not right, even although they be reported copious and free. The dejections should always be examined with great care; for, until the above-described matter is brought away, I never consider that I have made much advancement in the cure.

Calomel, in scruple doses, I have always

found most useful in removing this peculiar secretion. Sometimes I have combined the calomel with aloes, and continued it every night and morning, till the dejections became of a blackish gray colour, substantial and tenacious.* The purging draught and the enema were then had recourse to, with the best effects.

This practice was followed up regularly every day with leeches, blisters, &c. &c. according to circumstances. In a day or two the motions were usually observed to become dark green, which colour always indicated an approach to healthy action. The calomel and purging draughts were still continued, however, five or six days longer, till the dejections became more natural, and a visible improvement was observed in the appearance of the patient. He was then put upon an alterative course of medicine for a month or more, according to circumstances. This latter measure is absolutely necessary to prevent a relapse, which is very common, and always dangerous. I have frequently witnessed, both in this and in other diseases, where men have been returned to duty before the organic functions were restored to healthy action, a state of disease pro-

* Three, four, and even five scruples of calomel were usually taken, before this effect was produced; and the black, gray colour seemed always indicative of the action of calomel, being precisely the colour which is produced by calomel combined with ammonia.

duced, which, if it did not affect their lives, rendered them unfit for service, before they had been many years in India.

This plan of treating the epidemic cholera, which was adopted in the general hospital at Madras under my charge, during the prevalence of that disease from 1819 to 1823, was attended with a success that certainly far exceeded my expectations.

I shall here enumerate the phenomena which directed my indications of cure, and by which I always regulated the subordinate details of the treatment: —

First.—The general symptoms of a congestive state of the brain, heart, lungs, liver, and abdominal viscera.

Second.—The black and thick state of the blood, and the presence of venous-coloured blood in the left auricle and ventricle, and in some of the arteries.

Third.—The singular vermilion tinge upon the upper part of the small intestines; and the dark venous vascularity of the lower part of the ileum.

Fourth.—The peculiar viscid, tenacious, cream-coloured secretion and accumulation in the intestinal tube, which sometimes not only filled it, but actually glued it together.

Fifth.—The change of the colour of the blood

from black to red, while flowing from the arm; and the success of venesection in checking the disease indicated by this change.

Sixth.—The favourable change which always followed dark, gray-coloured, and viscid dejections.

Seventh.—Dark green evacuations succeeding to the above-characterised motions, and the indication which the former furnished, viz. an approaching return to healthy function.[1]

Eighth.—Collapsed state of the bladder and want of secretion of urine, and its secretion and appearance always proving favourable.

These were the circumstances of the disease I always kept in view in treating cholera, and I never lost sight of them throughout the cure. My object was to remove congestive symptoms, and to effect the discharge of the viscid, tenacious matter from the bowels. Bleeding, both general and local, antispasmodics, æther, ammonia, and camphor, with stimulating external applications, effected the first; and calomel, with aloes, the latter. I have often thought that much benefit was derived from the *drogue amère* already alluded to; and the gums composing it certainly appeared to be useful in aiding the calomel to remove this viscid and tenacious matter from the intestines; and therefore I often gave it with calomel, in doses from ℥ss. to ℥j. mixed with the camphor

draught, and I was confirmed in the opinion by appearances, and by examinations after death; for I observed, in some cases, that the viscid matter had been carried half down the ileum, leaving the upper part of the canal completely free from it.

The vast accumulation of this matter, and its uniform presence in all cases of cholera, in addition to the difficulty of removing it, led me to believe that relapse was frequently occasioned by its continuance in the bowels, even after the circulation had been restored; and therefore I considered its removal as a primary object, because it must be evident, that where the intestine is lined with such viscid matter, the action of medicines upon the living fibre must be interrupted, and the case protracted.

Observing, even after the congestive symptoms were overcome, that little progress was made in the cure, till blackish gray, and, subsequently, dark green, viscid dejections were procured, I was anxious to see what effects could be produced upon the secretions of the stomach and intestines by bringing in contact the various medicines used in cholera with the secreted matter. With this view I removed a considerable quantity of this matter from the intestines of a fatal case of cholera, where it was found in considerable quantity, and made a deliberate and patient trial in the presence of several medical

men who were doing duty with me in the hospital; and the following were the results:—

The secretion itself was concentrated, cream-coloured, or grayish yellow, like healthy pus. When mixed with alcohol, it formed a number of discrete coagula, minutely divided: colour unchanged or ochery.

Ammonia, æther, and camphor, produced no alteration whatever upon it.

Diluted nitric acid precipitated it in small flocculi; tartaric acid in solution, and in considerable quantity, completely dissolved it, and rendered it perfectly fluid.

Cystic bile dissolved it sensibly, the mixture being intermediate in colour between the two.

Calomel, mixed with it in small quantity, formed a dark greenish gray, precisely similar to the dark gray dejections already mentioned, and appeared to dissolve it.

Calomel and cystic bile combined rendered it more fluid, and produced a dark green colour.

These experiments were repeated as often as opportunities occurred, but without removing the secreted matter from the intestines, and the results were invariably the same.

The conclusion, therefore, which I draw from the foregoing facts are—

1st. That tartaric acid is the most useful drink, from its dissolving the matter.

2d. That calomel unites with and separates

this viscid matter, and produces those black, gray dejections which precede recovery, and which are unaided by, and unmixed with bile.

3d. That the green dejections which succeed to the former arise from cystic bile and calomel, in combination with this matter.

These experiments have thrown a new light upon the treatment of cholera; and in all cases which came under my care afterwards, the principles indicated by them were observed and followed. Lemonade was given as common drink, which was always particularly agreeable to the patient; calomel, in full or scruple doses, with *drogue amère,* was repeated boldly and with confidence; and when the congestive symptoms were once overcome, and the circulation restored, the subsequent treatment became simple and certain.

When I saw dark gray dejections, I considered that the calomel was doing its duty; and when I found them change to green, I felt satisfied that the biliary ducts were emulged, that bile had commenced to flow, and that all was safe.

It must be remembered, and I cannot repeat the caution too often, that in every instance the strictest vigilance is necessary; the medicines should never be discontinued till healthy secretions are produced; and even after they have been produced, laxatives and alteratives should

be taken daily, for at least a month after the patient is considered perfectly recovered.

The urine seldom flows freely till a day or two after these viscid, tenacious dejections have passed off: this is a symptom that should never be lost sight of, as the patient cannot be considered quite safe till this excretion is re-established.

The effects of calomel, lemonade, tartaric acid, and cystic bile, on the secretions of the intestines, seem to be deserving of attention in the treatment of fever, and many other diseases.

SECTION II.

Farther Remarks on the Treatment of Epidemic Cholera, with Details of Cases in Illustration of this and the preceding Section.

I HAD, in common with many other medical men, a horror of this disease, from the various reports which I had received of it, and the unsatisfactory account given of its treatment. The instructions, too, derived from superior authority, were so vague, that it was impossible to draw any rational conclusion from them. Magnesia and milk, burnt cork and castor oil, were all in their turn recommended as specifics. With such in-

formation, therefore, I really felt at a loss how to treat the first cases that came under my care; and my attention was consequently directed to the treatment of symptoms alone, till experience taught me, that to remove congestion, and restore the balance of circulation, were the first indications of cure; and that if these were attended to in the early stage of the disease, it became as manageable as most other acute diseases.

I likewise soon discovered that many of the notions which had gone abroad, and which had been strongly inculcated, were erroneous: for instance, to drink any thing cold was supposed to be attended with direful consequences. This is the reason which induced me at first, in these cases, invariably to give warm brandy and water and rice-water, though actually loathed by the patient. This loathing of warm fluids on the part of the patient was such as could not have escaped the attention of the most common observer; for although the patient appeared to be dreadfully distressed by thirst, and was always calling for cold drink, yet, when any thing warm was presented, he put it from him with disgust.

Anxious at all times to consult the dictates of nature in the treatment of disease, where there is no decided and manifest objection; and as I saw no good reason why warm drinks should be exclusively essential in this disease, more especially

as there was so strong a predilection for cold drinks on the part of the patient, I resolved to step out of the beaten path, and gave my patients the nitric acid agreeably diluted; and I was gratified to find not only that no bad consequences followed, but that it was a most pleasant beverage to the patient, relieving that most distressing and urgent symptom already insisted upon, viz. the burning sensation at the stomach. This, therefore, became the general drink in the hospital, in this disease.

It occurred to me, that, as the system seemed to be deprived of oxygen, the nitric acid might, in some degree, supply the deficiency.* Whether it acted in this way or not, I will not take upon myself to say: but this I know, that it was always most gratifying to the patient in allaying distressing thirst, and in removing the parched dryness of the tongue.

The cases of Shaw, Mootamah, Mooto, and Sparling,† were the first that gave me confidence in the practice of depletion, which further experience confirmed; and upon this foundation I established the mode of treatment subsequently found to be so successful. It will appear, that

* I frequently entertained the idea, that the inhalation of dilute oxygenous gas, or the nitrous oxide, might prove beneficial in this disease; but I had no conveniences or apparatus for putting it in practice.

† See pp. 178, 179, 180, 181.

most of the fatal cases were nearly moribund on their first admission into the hospital; on the other hand, all the cases that recovered were brought for assistance before the circulation had completely ceased, and when blood could be freely drawn.

Fifty-nine cases of epidemic cholera were treated by me in the general hospital at Madras, from the 23d May till the 23d of August, 1819; of which number fifteen died, nearly one in four, as the following statement will shew:—

From the 23d to 27th May	10 were admitted,	5 died.
1st to 23d June	15 ditto	6 do.
3d to 5th July	6 ditto	1 do.
7th to 23d August	28 ditto	3 do.
	59	15

In the cases where recovery took place, the disease was met at an early period; and in those which terminated fatally, four, five, and six hours had elapsed from the first attack, before medical assistance was had recourse to. From this fact it appears evident, that if the disorder be taken at its commencement, or within an hour after the seizure, it is as manageable as any other acute disease; but the rapidity with which it runs through its course, requires the most active exertions before it can be checked, and the loss of an hour may cause the loss of a life!

The following extract of a letter from a very able professional friend, will give additional con-

firmation to the truth of this remark, more especially as it was written at a moment when he was surrounded by cases of epidemic cholera, and when his feelings were all alive to the destructive powers of this disease. "You know, I suppose, that we were detained a fortnight in camp between the Mount and Poonamalee, not being able to pay the detachment; during that time, as might be expected, almost all the men were drunk regularly every day, and we were prepared by such excesses to suffer from any disease. We have, however, been particularly fortunate till our arrival at this station, not having lost a man, or having had one seriously ill, though we had been under canvass above five weeks. We fell in with a battalion of native infantry, who were suffering from cholera. The next day six Europeans were attacked: the number increased daily, and most of the first cases proved fatal.* I have just examined my journal, and find that we have had forty-six cases, and that eighteen have died—sixteen out of the first thirty attacked, and two only out of the last sixteen. Our detachment is composed of very old and very young men; the former were volunteers

* In this instance the predisposition to disease had been created by previous excesses, and the arrival of the detachment at a station where the epidemic influence was in operation, occasioned the appearance of this malady amongst those thus predisposed to its operation.

from the 84th and 86th regiments, and the latter young recruits. The disease for many days raged among the old soldiers, and the fatal cases, with the exception of four, occurred in their number. Persuaded that the first and principal object is to restore the balance of circulation, and that bleeding is the most likely means of doing so, it was always the first remedy employed. Many of the men not wishing to believe they were attacked with the disease, delayed coming for advice till they had tried burnt arrack, chillies, &c. in their own tents. The consequence was, that the blood either would not flow at all, or in such a way that the operation was of no use. Most of the first cases were of this kind, and very few recovered; latterly they were alarmed, and generally came in good time; the blood then flowed freely, and most of them recovered. The blood in every case was at first nearly black, and of the consistence of oil; if it ran freely, the colour became lighter and lighter, and at last natural. I particularly remarked when this happened, that the pulse was always to be felt afterwards, and *not one died*."—This detail is quite consistent with what I have myself seen.

The following eleven cases were treated at the same time as the eight unsuccessful ones, the first detailed in the early part of this treatise. They followed each other in regular succession, from the 23d of May till the 23d of June, 1819;

they are all faithful and unadorned reports, made at the bed-side of the patient.

CASE XIV.

27th May, 1819.—James Shaw, private H. M. 84th regiment, aged thirty-seven years, while in the tents on the south beach, was attacked, about ten o'clock, P. M., with severe pain in the lower part of his belly, and with continued purging and vomiting; he first discharged the contents of the stomach and colon, and afterwards a muddy, watery, and offensive fluid; the pulse was small and struggling; skin covered with cold dew; confusion of his head, and cramps in the extremities. I understand he had thirty ounces of blood taken from his arm in the tent, before he was sent to the general hospital. When he arrived there, about eleven o'clock, P. M., his pulse was perceptible, but the skin continued cold, and covered with a clammy dew. He complained of the uneasiness about his head being very distressing. Twelve leeches were immediately applied to each temple, and the following draught given:—

℞ Sp. Æther. Vitriol.
Tinct. Opii, āā ʒj.
Mist. Camph. ℥ij.
M. ft. haust.

Ten o'clock, A. M.—The leeches have bled very freely; pulse quick, and of rather greater volume, but the skin is still covered with a clammy dew, though warmer than it was; has neither had vomiting nor purging since admission into hospital; he feels drowsy and sleepy. Let him be well covered with blankets, and allowed to remain quiet. He slept the greater part of the night, and had neither vomiting nor purging.

28*th.* — The pulse much improved and stronger, but irregular and confused, 80 in a minute; tongue rather white; great confusion in his head. Let twenty-four leeches be applied to the back of the neck, as near the base of the skull as possible; and give him ℥iij. of the purging mixture immediately.

Evening. — The leeches have bled freely, and he has had two full motions. Head much better, and his general feelings greatly improved.

℞. Calomel. gr. x.
Conf. Rosarum, q. s.
Ft. pilul. h. s. s.

29*th.* — Complains of an unpleasant pain at the top of his head, which is confined to the space of a shilling. Let three leeches be applied immediately to the spot, and repeat the purging draught.

Evening. — The leeches drew ℥ijss. of blood, and the pain is quite removed; he feels in every respect better.

Rep. pil. Calomel.

30*th.* — Has no complaint at all; he feels perfectly well.

Repeat the purging draught.

31*st.* — Fit for duty.

CASE XV.

26*th May*, 1819. — Mootamah, a native woman, aged 18 years, wife to a private of the 84th regiment, was brought to the general hospital about seven o'clock, P. M. She complained of excessive pain and burning about the umbilicus and lower part of the body; spasms at the stomach; violent retching and vomiting of watery fluid,

and frequent dejections of the same kind, with grinding pain, and contraction in the lower part of the belly; skin cold and covered with a clammy dew: pulse small and languid: she expresses great fear of death. A vein was immediately opened, and a few drops of blood, sizy and black, came away; but her arm was put into warm water, and in a short time the blood began to flow freely. Twenty-four ounces were taken, and the sizy, thick appearance of the blood was changed to a more florid and fluid state. As the blood flowed she felt relief, and by the time twenty-four ounces were taken, the pulse returned, and was full and soft. She was covered with large drops of perspiration, but complained of no pain of any kind, and she asked for food. An opiate draught was given, which put her to sleep for four hours; she awoke perfectly free from all uneasiness.

27th.—Two ounces of castor oil, with a little aq. menth. was given, which operated very well, and she was discharged quite cured in the evening.*

CASE XVI.

27th May, 1819.—Mooto, native dresser, belonging to the general hospital, was attacked with symptoms of spasmodic cholera on the morning of the 27th May, 1819, as he was proceeding on his duty round the hospital. He was bled instantly, to the amount of twenty-two ounces, and took an opiate draught, and was perfectly well in two hours.

* This woman had not been attacked ten minutes when she was brought to the hospital.

CASE XVII.

1*st June*, 1819.—S. SPARLING, a healthy woman, of a spare habit, aged 36 years, and a patient in the general hospital for a sore leg, was attacked suddenly this morning, about half-past nine o'clock, with violent and acute spasmodic pains about the lower part of the belly and legs, and was covered with cold, clammy perspiration. The tongue was excited and white—not dry; pulse small, frequent, and very weak; vomiting and purging of watery fluid; eyes sunk, and great expression of anxiety and fear in her countenance. I saw her at ten minutes before ten o'clock, and ordered venesection immediately, and the following draught to be given:—

℞ Tinct. Opii,
Sp. Æther. Vit. āā ʒj.
Aq. Cinnamon,
Aq. Puræ, āā ℥j.
M. ft. haust.

When the vein was opened the blood did not flow, was black and sizy, and only oozed out in drops; by friction, however, it came away with more freedom, and as it flowed from her arm, she expressed the relief it gave her. When sixteen ounces had been drawn the spasms returned, and the blood ceased to flow during their continuance, which was not more than a minute or two; but in that time a coagulum had filled up the orifice in the vein. This having been removed, sixteen ounces more of blood were abstracted, which relieved her, and she felt no sensation of faintness or sickness at stomach, although covered with cold perspiration; but she expressed great relief as the blood was flowing from the arm. About this

time the blood began to change from a black and sizy to a more florid and fluid state, and six ounces more were allowed to flow before the arm was tied up.

Half-past ten. — The spasms still continue in her legs and feet, though by no means so severe as they were; the pulse is softer and fuller, 96 in a minute; she complains of considerable pain, and spasmodic twitchings about the lower part of the belly.

Let her extremities be well rubbed with spirits of turpentine, and bottles filled with warm water be applied to her feet.

Three ounces of the domestic injection, with ʒj. of tinct opii, to be exhibited as soon as possible.

Half-past eleven o'clock. — Much better in every respect; quite free from pain and spasms; skin cold and clammy; feels lightness in her head, and considerable thirst; tongue dry, and very white; pulse quick and sharp, 106 in a minute; she is very thirsty.

A little weak brandy and warm water occasionally, and a large spoonful of the following mixture, every two or three hours: —

℞ Mist. Camph. ℥vj.
Sp. Æther. Nitros. ʒij.
Aq. Ammon. ʒj.
Ft. mist.

Three o'clock, P. M. — No return of spasms; but she complains of sharp pain at the epigastrium, and round the umbilicus.

Let eight large leeches be immediately applied over the part pained, and continue the mixture.

Five o'clock, P. M. — The leeches have bled very freely; pain much diminished; skin hot but clammy. As the thirst continued, warm congee-water was given occasionally.

Six o'clock, P. M. — Complains very much of acute pain at the crown of her head, which is confined to one spot, of great weight and pain at the base of the skull, of tightness over the head, and imperfect vision. Let the head be immediately shaved, and five leeches applied to the spot where she complains of pain, and five more at the base of the skull.

These bled remarkably well, and completely removed all the unpleasant symptoms.

Nine o'clock, P. M. — Perfectly easy; thirst less urgent; pulse 102; skin moist; no pain of any kind; has not had any motion since morning.

℞ Calomel. gr. x.
Opii Puri, gr. j.
Ft. pilul. ij. statim sumendæ.

She was put to bed, well covered, and had two attendants to watch her during the night.

Two o'clock, A. M. — Passed an excellent night, and was not at all disturbed. Spasms entirely left her; felt an inclination during the night to relieve the bowels, but could not; tongue foul and white; pulse 90 in a minute; skin moist and warm; head light, but no pain; that which she complained of at the crown of her head and base of the skull is completely removed by the leeches.

℞ Ol. Ricini, ℥ij.
Aq. Menth. Pip. ℥jss.

To be taken immediately, and to be assisted by the common domestic enema.

Twelve o'clock.—The bowels perfectly and fully emptied; dejections of a yellow colour; tongue still white and dry.

℞ Mist. Salin. Febrif. ℔ij.
Aq. Ammon. ʒss.
Sp. Æther. Nitros. ℥ij.
Ft. mist.

Two ounces of this mixture to be taken every three or four hours.

Five o'clock, P.M.—Pulse very quick, 120 in a minute; skin of the natural temperature; no pain of any kind; has been purged four times, and passed dark-coloured slime in the last motion; tongue cleaner, and very little thirst.

Cont. Mist. Salin.
Rept. Pilul. Calomel. statim.

Let her have a little arrow-root.

3*d*.—Passed an excellent night; no pain at all; the calomel acted slightly on her bowels, and brought away a very dark-coloured, slimy motion; pulse small; skin warm; tongue clean and moist.

Rept. Haust. Olei, et Enema.
Contin. Mist. Salin. Febrif.

Evening.—The medicines have operated well; tongue clean; pulse good.

She continued to take calomel at bed-time, and the purgative every morning, till the 5th, when she was perfectly well.

CASE XVIII.

William Wilson, Honourable Company's pensioner, aged 40, has been a patient in the general hospital for some time, with sore eyes.

June 10th, 1819.—He was attacked this morning, at

eight o'clock, A. M., with vomiting and purging, excessive pain and burning sensation at the navel, and general spasms; the muscles of the abdomen were all drawn towards the spine. The skin was cold, pulse small, and face covered with large drops of perspiration.

Thirty-two ounces of blood were immediately abstracted, and the following draught was given:—

℞ Tinct. Opii,
Spt. Æther. Vit. āā ʒj.
Mist. Camph. ℥j.
Ft. haust.

Half-past three, A. M.—Spasms completely checked; no vomiting nor purging; skin continues cold, with cold, clammy perspirations; still complains of severe pain about the navel, but, to use his own expression, "he is in heaven to what he was;" pulse languid.

Let eighteen leeches be applied to the umbilicus immediately. Repeat the draught, and administer an anodyne enema with camphor.

Half-past eleven.—The leeches have dropped off, and the pain is greatly relieved.

Pulse quick, but soft and full; tongue excited; no vomiting nor purging.

Twelve.—The pulse is much improved, but the pain in his belly is returned with great severity. Apply a large blister over the whole belly.

Five, P. M.—The blister has risen well, and he is quite free from pain. Tongue excited and white, but moist; no purging nor vomiting; pulse soft and good, 98 in a minute.

Let him have warm congee-water to drink, and give the following pill immediately:—

℞ Calomel. gr. xx.
Opii, gr. ij.
Ft. pilulæ.

I now consider him out of all danger.

11*th.*—Passed an excellent night; pulse good; tongue less excited; no pain; has not had any motion.

℞ Olei Ricini, ℥ij.
Aq. Menth. Pip. ℥ij.
Tinct. Opii, ♏xxx.
M. ft. haust. Statim sumendus.

Had one large stool from the oil, which was perfectly natural, with some mucus; no pain of any kind; pulse regular; tongue clean and moist; skin cool.

Let the following draught be given at bed-time:—

℞ Elix. Parigor. ʒiij.
Aq. Ammon. ♏xx.
Spt. Æther. Nitros. ʒj.
Aq. Menth. Pip. ℥jss.
Ft. haust.

12*th.*—Pulse good; skin rather white; no appetite; had a good motion this morning.

℞ Infus. Amar. Comp. ℥jss.
Tinct. Sennæ, ʒiij.
—— Cardam. ʒiij.
Aq. Ammon. ♏xxx.
Ft. haust.

This draught was repeated every night and morning till the 15th, when he was perfectly recovered.

CASE XIX.

James Farrall, private in H. M. 13th Light Dragoons, aged 26, was attacked, about eight o'clock in the evening of the 19th of June, with vomiting and purging; general cramps and flying pains all over him, for which some castor oil and laudanum were given, in the barracks; but about ten o'clock, p.m., the spasms became exceedingly severe in his stomach, legs, arms, face, and lower jaw. He was, in consequence, sent to the general hospital, where he arrived at eleven o'clock. The spasms were excessively severe when he was admitted; the pulse languid and small, but evidently oppressed; skin cold, though not so much so as it usually is in this stage of the disease.

Thirty-eight ounces of blood were immediately taken from the arm, which flowed in a full stream. Frictions, with spirits of turpentine, were applied over the legs and body, and bottles full of warm water to his feet and between his thighs.

Half-past eleven, p. m.—Very much relieved. Continue the frictions, and give twenty grains of calomel, with two grains of opium, immediately.

Twelve.—The spasms returned with great severity; every muscle in the body was as hard as a board, and he roared most violently with pain in his stomach; pulse small, but with a sharp beat. Let twenty-five leeches be applied to the stomach immediately, and the following draught be given :—

℞ Tinct. Opii,
Spt. Æther. Vit. āā ʒj.
Aq. Puræ, ℥j.
Ft. haust.

Continue the turpentine friction and hot bottles.

Half-past twelve o'clock.—Pain and spasms continue; twelve leeches only have fastened at the epigastrium.

Repeat the draught, and give him occasionally a little warm brandy and water.

One o'clock, P. M.—No change; apply twelve leeches to the temples, and give warm congee-water and brandy for drink.

Half-past one.—The pain and spasms have subsided, but he feels great coldness, and complains of it. Give the following draught:—

℞ Aq. Ammoniæ, ♏l.
Aq. Puræ, ℥j.
Ft. haustus.

Two, A. M.—He now feels quite relieved in every respect, and has fallen asleep.

Three, A. M.—Complains of lightness and uneasiness in his head; pulse much improved. Let twelve more leeches be applied to the back of his head. Repeat the calomel pills.

20*th, five o'clock,* A. M.—All the leeches have done their duty fully, and upwards of thirty ounces of blood have been abstracted by them altogether: he has neither vomiting nor purging. The spasms and uneasiness in the head are completely removed.

Let a domestic enema be exhibited immediately. Continue the congee-water, and a little arrow-root occasionally. Nothing else was given during the day, and he continued perfectly free from pain or uneasiness. The enema had very little effect.

℞ Calomel. gr. xx.
Opii Puri, gr. ij.
Ft. pilulæ, h. s. s.

21*st.*—Passed a good night; feels no pain except in his loins; tongue clean; has not had any motion. Give the following draught immediately, and let a purgative enema be administered without loss of time.

℞ Olei Ricini, ℥iij.
Aq. Menth. Pip. ℥ij.
Ft. haust.

Evening.—The enema has had effect, and brought away some feculent matter, previous to the discharge of which he was a good deal griped; pulse quite regular, 78 in a minute.

Repeat the calomel pills at bed-time, and let him take a small wine-glassful of the following mixture every four hours: —

℞ Mist. Salin. Febrif. ℔j.
Aq. Ammon. ♏lx.
Spt. Æther. Nitros. ʒij.
Tinct. Opii Camph. ℥j.
M. ft. mist.

22d.—Feels quite well this morning; pulse good, 78 in a minute, but he has not been purged. Give ℥iij. of the purging mixture immediately.

Evening.—Felt himself so well in the morning that he has been running about all day, and has been attacked this evening with giddiness in his head and uneasiness in his belly; pulse quick and rather strong; the purging mixture has had very little effect.

Apply 28 leeches to the base of the skull immediately, give a purging enema, let the abdomen be well fomented, and repeat the calomel pills.

23d.—The leeches relieved his head the moment they

began to draw, and he passed a tolerably good night; pulse regular, 86 in a minute, full and soft. Tongue foul; had a dose of the purging mixture about five o'clock this morning, but it has not operated.

Let a purging enema be administered immediately, and one large spoonful of the following mixture be given every three or four hours.

℞ Mist. Camph. ℔ss.
Spt. Æther. Nitros. ʒij.
Aq. Ammon. ♏xxx.
M. ft. mist.

Evening. — He has been fully purged in the course of this day; the motions consist of dark green, and a black, viscid, tenacious matter. He is perfectly free from pain of any kind. Continue the mixture.

24*th.*—Feels perfectly well this morning, except from a pain in his loins. Apply a warm plaster to the small of his back. Continue the mixture, and repeat the purgative. This treatment was continued regularly till the 28th, when he was perfectly recovered.

CASE XX.

Mary Cramer, the wife of a private in H. M. 13th Dragoons, just arrived from England; admitted into the general hospital about eight o'clock, p. m., the 20th June, 1819.

She was attacked about an hour since, in the barracks, with vomiting and severe cramps in her stomach and bowels; she was also purged twice, and the evacuations, both from the stomach and bowels, were a white, watery, flocculent fluid. She is exceedingly restless, and complanis much of thirst; nothing had been given to her

in the barracks except a little brandy and water, and in this state she was brought to the hospital.

Twenty-eight ounces of blood were immediately taken from the arm, which gave her some relief; but the cramps and vomiting still continued, both in her legs and stomach.

Frictions with spirits of turpentine were used to her legs, eighteen leeches applied to the stomach, an opiate enema with camphor was administered, and the following draught given:—

℞ Tinct. Opii,
Spt. Æther. Vit. āā ʒj.
Mist. Camphor. ℥j.
M. ft. haust.

Ten o'clock, P. M.—She vomited the draught immediately, but retained the enema, and the leeches appear to be drawing well; spasms in the legs much relieved, and she has much less pain in the stomach. Give the following pills immediately:—

℞ Calomel. gr. xx.
Opii Puri, gr. ij.
Ft. pilulæ.

Eleven o'clock.—She is perfectly free from pain or spasm; pulse soft and good; leeches have bled very well, and she is disposed to sleep.

21*st.*—Slept well all night; pulse good; tongue rather white and excited; feels some pain and heaviness in her head, with intolerance of light, but she has no spasms, nor pain either in her legs or stomach.

Apply twelve leeches to the back of the neck imme-

diately. Let a purging enema be administered, and the following draught be taken:—

℞ Olei Ricini, ℥ij.
Aq. Menth. Pip. ℥ij.
Tinct. Opii, ♏xx.
M. ft. haustus.

Evening.—The leeches have relieved her head wonderfully, and she is better in every respect, though the purgative has had very little effect.

Repet. Pil. Calomel. gr. xx.

22*d.*—Free from all pain of every kind; her bowels have been very fully acted upon during the night, and the medicine is still operating; skin moist; pulse soft and full, but weak. Let her have a little arrow-root and wine, and give two table-spoonsful of the following mixture every two or three hours:—

℞ Mist. Camph. ℥vj.
Aq. Ammon. ♏xxx.
Elix. Parigor. ℥j.
Confect. Aromat. ʒj.
M. ft. mist.

Evening.—Feels much better in every respect. No medicine.

23*d.*—Pulse 74, not strong, but tolerably good; she was griped in the night, but not purged; no pain or uneasiness, either in the head or stomach. Continue arrow-root as before. Let a common domestic enema be administered, and give the following draught immediately:—

℞ Olei Ricini, ℥ij.
Tinct. Opii, ♏xx.
Aq. Menth. Pip. ℥ij.
M. ft. haust.

Evening.—Her bowels have been freely emptied; dejections of a dark green colour. She is much stronger, and feels in every respect better. Let her have an anodyne draught at bed-time.

24th.—Passed a tolerable night, but her tongue is white and excited; the pulse is stronger, and rather quick, and she feels some lightness in her head; but has no pain of any kind.

Apply a blister to the nape of the neck, and repeat the oleum ricini.

Evening.—Has had several copious motions since morning; the blister has risen well; head much relieved; skin cool; tongue continues foul; pulse small; but she has no pain nor uneasiness of any kind.

℞ Calomel. gr. viij.
Opii Puri, gr. j.
Syr. q. s.
Ft. pil. h. s. s.
Olei Ricini ℥ij. very early in the morning.

25th.—Has taken the oil with excellent effect; she feels weak, but is much better in every respect, and has an appetite. From this time she recovered, and required nothing more than an occasional laxative till the 29th, when she was perfectly well.

CASE XXI.

William Brian, private in H. M. 13th Dragoons, aged 23, was attacked in the barracks, about five o'clock, P. M., 22d June, 1819, with purging and vomiting of a watery fluid; violent spasms in the stomach and bowels, and with all the usual symptoms of epidemic cholera. He was bled freely by the assistant-surgeon of the regi-

ment, and the vomiting, purging, and spasms, &c., ceased at once.

He was brought to the general hospital about eight o'clock, P. M., complaining of great pain and oppression at the epigastric region.

Twenty-five leeches were immediately applied, and he took the following pills:—

℞ Calomel. gr. xx.
Opii Puri, gr. ij.
Ft. pil.

23*d*.—He passed a quiet night; the leeches remained upon him for a considerable time; pain at the epigastrium relieved, though he occasionally feels it, and he complains of oppression in his breast, and difficulty of breathing; pulse 64 in a minute; no uneasiness about the head.

Apply eight leeches to the right hypochondriac region, and twenty between the ribs, extending from the spine towards the sternum, and give him a purging enema immediately.

Evening.—The enema acted upon his bowels, and brought away a great deal of morbid, black matter. He has been asleep almost ever since; the leeches have bled freely, and relieved him very much; the oppression is removed.

℞ Calomel. gr. xx.
Opii Puri, gr. ij.
Ft. pilul. h. s. s.

24*th*.—Says he feels quite in heaven; has no pain nor uneasiness at all; pulse 72 in a minute, soft and regular, but the tongue is a little excited.

℞ Mist. Purgan. ℥iij.
Ol. Menth. Pip. ♏iij.
Ft. haustus, statim capiendus.

℞ Mist Salin. Febrif. ℔j.
Aq. Ammon. ʒj.
Vin. Antim. ℥ss.
M. ft. mist.
Capiat æger cyathum secundâ tertiâve quâque horâ.

Evening. — He feels perfectly well; his bowels have been well acted upon. He recovered from this time, without taking any other medicine except an occasional laxative.

CASE XXII.

Ann Collingwood, belonging to H. M. 13th Dragoons, arrived from England, was attacked in the barracks, about half-past two o'clock, P.M., of the 23d of June, 1819, with the usual symptoms of epidemic cholera, and sent to the general hospital, where she was admitted at three o'clock, P.M. A little spirits had been given to her before she left the barracks, and this was all that was done for her. Complains of severe pain and burning heat at the epigastric region and scrobiculus cordis, and of spasms in her extremities. Skin cold, with a clammy perspiration all over her; pulse quick and thready. Twenty-six ounces of blood were immediately taken from her arm, and frictions with spirits of turpentine applied to the extremities, and over the epigastric region. She was well wrapt up in warm blankets, and the following draught given: —

℞ Tinct. Opii,
Spt. Æther. Sulph. āā ʒj.
Mist. Camph. ℥j.
M. ft. haustus.

Half-past three, P. M. — The bleeding relieved the spasms immediately; she feels better generally, but the pulse is exceedingly small and frequent, and she has a strong desire to sleep, which is indulged.

Ten, P. M. — Has slept till this time, without any return of pain or spasm, and she feels better. Give the following pill immediately: —

℞ Calomel. gr. xx.
Opii Puri, gr. ij.
Syr. q. s.
Ft. pil.

29*th.* — Complains this morning of great thirst; tongue white and excited; has not had any motion, but she has neither pain in the stomach nor head. Pulse 76 in a minute, rather irregular. Give her the following purging draught immediately, and let her take a wine-glassful of the saline mixture every three hours.

℞ Olei Ricini, ℥ij.
Tinct. Opii, ♏xx.
Aquæ Menthæ Pip. ℥ij.
M. ft. haust. purgans.

℞ Mist. Salin. Febrif. ℔ij.
Aq. Ammon. ♏xxx.
Sp. Æther. Nitros. ʒij.
Antim. Tart. gr. ij.
M. ft. mist.

Evening. — Bowels freely evacuated; stools of a very dark gray colour; she feels wonderfully relieved. — Cont. mist. salin. febrif.

30*th.* — She feels weak, but has no return of spasms or pain; passed a good night, and perspires freely.—Cont. mist. salin. febrif.

July 1st. — Her bowels are constipated, but she feels quite easy.

Rept. haustus Olei Ricini.
Contin. Mist. Salin. Feb.

She recovered from this time, and was discharged from the hospital perfectly well on the 3d July.

CASE XXIII.

23d June, 1819. — P. M'Kennah, aged 24 years, a private in H. M. 13th Dragoons, and just arrived from England, was admitted into the general hospital at nine o'clock, P. M., with violent pain and spasms in the extremities and stomach : his cries were dreadful, and the pain in the region of the stomach, arch of the colon, and edge of the diaphragm, appeared to be excessive, on the least pressure being made. The pulse is languid and small; skin cold, and covered with perspiration; and all the usual symptoms of epidemic cholera. He was attacked about an hour before his admission into the hospital. Forty-two ounces of blood were immediately taken from his arm, and the following draught given : —

℞ Tinct. Opii,
Sp. Æther. Vitriol. āā ʒj.
Mist. Camph. ʒj.
M. ft. haust.

Half-past nine o'clock, P. M. — He felt relief while the blood was flowing from his arm; the pain has now returned again in his stomach, and the pulse is hardly perceptible during the continuance of the spasms.

Let the chest and epigastric region be well rubbed with spirits of turpentine, and afterwards a large mustard poultice be applied over the whole abdomen; and give twenty grains of calomel and two grains of opium immediately.

Repeat the draught, and continue the friction.

Ten o'clock, P. M.—The pulse is increased, and the pain diminished. Continue as before.

Half-past ten o'clock.—Fast asleep.

Eleven o'clock, P. M.—Continues to sleep, and he breathes with more ease and freedom.

Five o'clock, A. M.—Slept the whole night; pulse 112 in a minute, and oppressed; tongue white and excited; hot skin; no pain of any kind; has no difficulty of breathing, nor uneasiness in his head.

Let him have a purging enema immediately, and ℥iij. of the purging mixture; and during the day give him a wine-glassful of the saline mixture, as follows:*—

℞ Mist. Salin. Febrif. ℔j.
Aq. Ammon. ♏xxx.
Sp. Æther. Nitros. ʒij.
Antimon. Tart. gr. ij.
M. ft. mist.

Evening.—Has been well purged; his skin is moist; pulse 84 in a minute, and he is free from all pain.

℞ Calomel. gr. xx.
Opii Puri, gr. ij.
Syr. q. s.
Ft. pil. h. s. s.
Cont. Mist. Salin. Feb.

30*th.*—Passed a good night; skin cool; tongue clean; pulse 64 and weak; no pain of any kind.

Cont. Mist. Salin.

Repeat the purging draught, and give arrow-root.

* In this case, the blood that was drawn from the arm was particularly red and florid, and with very little serum. It came languidly at first, but towards the last it flowed with freedom.

He was fully purged; motions dark, green, and feculent; feels weak, but in other respects quite well. Calomel at night, and a purgative in the morning, were continued, and he was perfectly recovered on the 5th of July.

CASE XXIV.

J. Horan, private H. M. 13th Light Dragoons, aged twenty-six years; admitted into the general hospital at half-past four o'clock, P. M., 20th June, 1819, with all the symptoms of epidemic cholera. Violent pain and spasmodic contractions of the limbs, and at the stomach; anxious countenance; cold skin; weak languid pulse. He was bled before he left the barracks, but I am not informed of the quantity taken; the symptoms, however, were so severe, that I ordered thirty-two ounces more to be immediately taken from his arm, and the following draught to be given:—

℞ Tinct. Opii,
Sp. Æther. Vit. āā ʒj.
Mist. Camph. ℥j.
M. ft. haustus.

Let the stomach and extremities be well rubbed with spirits of turpentine, and afterwards a large mustard poultice be applied to the epigastric region, and give twenty grains of calomel and two grains of opium immediately.

Five o'clock, P. M.—The skin is warmer, and he feels better, though he still has pain occasionally at the stomach; and the pulse is small.

Rept. haust. anodyne.

Half-past five o'clock.—Complains of considerable uneasiness in his head, and intolerance of light; pulse

frequent, but thready; skin hot, and thirst urgent. Apply sixteen leeches to the temples immediately.

Six o'clock, P. M.—Much less pain, but he is very restless, and complains very much of thirst; no motion since admission; says he has felt the inclination all day, but has not been able to relieve himself. Let a purgative enema be administered immediately.

Seven o'clock, P. M.—Voided the enema, but no fæces; his head feels very uncomfortable from a sensation which he cannot describe; no pain in the stomach. Repeat the enema immediately, and give the following pill;

℞ Calomel. gr. xx.
Opii Puri, gr. ij.
Syr. q. s.
Ft. pilulæ.

Half-past seven o'clock.—Voided an amazing quantity of scybala with the last enema; skin hot; pulse increased in strength and frequency; confusion in the head continues, and a noise like the roaring of the sea. Fourteen ounces more blood were taken from the arm, and the enema repeated.

Half-past nine o'clock, P. M.—Has had some feculent discharges from the bowels, since last report, which are morbid and offensive. The pupils of the eye are very much contracted, and he complains greatly of intolerance of light; thirst very troublesome.

Let eighteen leeches be immediately applied to the back of his head, and a wine-glassful of the following mixture given every two hours:—

℞ Mist. Salin. Feb. ℔j.
Aq. Ammon. ♏xxx.
Antim. Tart. gr. ij.
Sp. Æther. Nitros. ℥iij.
M. ft. mistura.

Half-past eleven o'clock.—The leeches have bled remarkably well, and his head is very much relieved; he can now look at a lighted candle without inconvenience; he has passed more hardened fæces with the enema. Repeat the enema and saline mixture as before, and give the following purging draught immediately:—

℞ Olei Ricini, ℥iij.
Ol. Menth. Pip. ♏v.
Aquæ Puræ, ℥ij.
M. ft. haustus.

29th, five o'clock, A. M.—Has passed rather a restless night; pulse 102 in a minute; the oil has operated, and brought away more hardened fæces; he is free from all pain, but there is great heaviness in his head, and the intolerance of light has again returned; the skin is above the natural temperature. Let twelve more leeches be immediately applied to the base of the skull,* and a blister behind each ear; continue the saline mixture. Let also the enema be repeated three times in the day, and the following draught given immediately:—

℞ Ol. Ricini, ℥iij.
Tinct. Opii, ♏xx.
Aq. Menth. Pip. ℥ij.
M. ft. haustus.

* From vein ....46℥ blood ..46

Leeches { 16, 18, 12 } ...... 57℥, by measure.

103℥ of blood in five hours, besides what had been taken away before his admission into hospital.

N.B.—The blood drawn was particularly black, with a large quantity of serum, and a metallic pellicle over the serum.

Evening.—He has been purged freely, and the blisters have done their duty remarkably well; but he continues very restless and uneasy; tongue white, and very much excited; skin considerably above the natural standard; pulse 106 in a minute; says he has no pain, but is distressed from the want of sleep; can look at the light better than he did, but there is evidently great uneasiness in his head.

Let the head be shaved, and cold vinegar and water constantly applied, and give the following pills immediately:—

℞ Calomel. gr. xx.
Opii Puri, gr. ij.
Syr. q. s. ft. pil.

Contin. Mist. Salina.

Ten o'clock, P. M.—Pulse 102; head relieved; he can bear the light quite well; no pain nor oppression; skin much reduced in temperature; tongue less excited.

Continue the saline mixture.

30*th, five o'clock,* A. M.—Slept a little in the night; skin cooler this morning; thirst still urgent; tongue dry and excited; pulse soft, about 90 in a minute; uneasiness in the head much relieved.

Let him have four ounces of the purging mixture immediately, and give him a little arrow-root.

Evening.—Has been purged very freely during the day; motions of a green colour, crude, and very copious; head greatly better, but the tongue is still excited, and the pulse is 88 in a minute.

Continue the saline mixture, and repeat the calomel pill.

July 1*st.*—Purged very freely during the night, and passed a considerable quantity of viscid, tenacious matter, of different colours, dark green, black, and white; tongue

less excited; thirst less; pulse 84; skin moist; head quite easy.

Rept. Mist. Purgans.
Contin. Mist. Salin.

2d.—Pulse 79 in a minute, regular, full, and soft; tongue less excited, and very little thirst; feels pain at the small of the back. He had two full motions in the night.

Rept. Mist. Purgans.
Cont. Mist. Salin.
Imponatur emplastrum picis lumbis.

Evening.—The medicines have acted very well; motions very copious, and of a dark green colour; there is slight increase of heat in the skin.

Repeat the calomel pills at bed-time, and let him take the purging mixture early in the morning.

Three o'clock, A. M.—The purging medicines have been acting very smartly; motions not so green as they were, but of a brown colour, and consisting of a quantity of morbid, feculent matter: pulse 82; skin comfortable; head easy; no pain in the stomach, side, or bowels; tongue less excited, and not so dry.

Continue the saline mixture.

℞ Pilul. Hydrargyri, ʒj.
Calomel. gr. xx.
Syr. q. s.
Fiat massa æqualis.

Divide into twelve pills, and let one be taken three times a day.

℞ Infus. Gentian. Comp. ℥vj.
—— Sennæ, ℥iij.
Tinct. Cardam. ℥jss.
M. ft. mist.

A wine-glassful to be taken night and morning.

Evening.—His motions during the day have been extremely black and morbid; pulse 66; in all other respects the same.

4th.—His mouth is sore this morning, and he has considerable ptyalism; passed a bad night; had no motion during the night; complains of pain in his eyes this morning, though he can look at the light very well.

Omit the pills, but continue the bitter aperient mixture night and morning, and the saline mixture through the day.

Evening.—His motions are by no means so dark as they were, but he complains very much of pain at the occiput, and of vertigo.

Apply ten leeches to the occiput immediately.

5th.—The leeches have removed the pain; pulse 88; tongue rather excited; very little thirst; had one motion in the night, of natural appearance; mouth very sore, and considerable ptyalism.

He recovered from this time, by taking the aperient mixture regularly night and morning till the 12th, when all medicines were discontinued.

CASE XXV.*

Veerdoopettah, August 17th, 1820.—At this place the spasmodic cholera seized me, at about half-past one in the morning. I had been unwell from the 12th, and had quite lost my appetite; but on rising this morning I found my head unusually heavy, with a great difficulty of

* As this case is interesting in several points of view, especially as respects the early symptoms and treatment of the disease, I give it in the words of the patient, as drawn up by him soon after his recovery.

breathing. I called my people up, and gave orders to march to Madura (distance about twenty-eight English miles). My head was now so very painful and heavy, as to oblige me to recline it on the table.

Before the cattle could be put to, I was seized with a severe, acute, cutting pain across the lower edge of the belly, and an instantaneous inclination to stool. I went out, when, to my astonishment, a flow of water gushed like a torrent from me, and the whole of the internal organs seemed to have dissolved to one mass of fluid. Before I could leave the spot, these severe evacuations were repeated at least four or five times.

At a quarter before two, my medicine-box having been packed up, and not wishing to create an alarm among my people, and having drogue amère at hand, I took a powerful draught of it, which I retained, and got into a covered cart, in which I was conveyed thirteen miles by little after sunrise. The purging being very frequent and severe during the march, I took about ten or fifteen drops of oil of peppermint in a beetle-leaf; with the next evacuation the leaf passed through me. At this time I became so very weak, and the spasms so severe, that I ordered a halt, and took down from the bandy my cot and box. From the latter I got my medicine, and took the ammonia draught, as prescribed by my friend Wilkins, which I immediately threw up. I afterwards took drogue amère, with peppermint and brandy, &c. which also came up. The spasms and purging at this time were very severe, and I became so debilitated as not to be able to move from my cot without being lifted. I had, however, in the interim, sent people out to endeavour to get a country dooly, or litter, to convey me to Madura, whence I was distant fifteen miles, and despatched my horse-keeper with a note to the officer commanding there, re-

questing he would prevail on the medical officer to come out a few miles on the road to meet me. The horse-keeper was scarcely gone, when Dr. Kenny, of his Majesty's 89th regiment, who was at a neighbouring village, having heard of my situation, very humanely sent a litter for me. On my arrival at the village, Dr. Kenny bled me; and I soon found that it had the effect of checking the spasms a good deal. I moved on immediately towards Madura, and was met by a native dresser. This man gave me calomel powders with very strong draughts, and, as well as my recollection serves, he repeated them three or four times before I arrived at Madura. I was then much weakened and quite helpless, and had given up all thoughts of recovery. It would not be improper here to mention, that although I had a craving desire to drink water, it did not proceed from thirst, but a burning heat in the stomach, throat, and tongue.

Shortly after my arrival at Madura the purging ceased, and I found no other symptoms but the spasms, and the heat in the stomach, &c. which were not so severe as they had been. It was then about five in the evening. Mr. Neilson, the medical officer at Madura, attended me immediately at the commanding officer's house, where I was taken; and, by his kind attention, I recovered.

SECTION III.

Remarks in proof of the Non-contagious Nature of the Disease, and on the Preservative Means which may be adopted in order to escape from its Attack.

Before I conclude my observations on the epidemic cholera which has lately ravaged India, I shall first add a few remarks in support of the opinion I have already stated (see p. 134), that the disease did not appear to be contagious; and next notice a few of the measures which seemed to me to have been best calculated to prevent its invasion.

First, as respects the non-contagious nature of the epidemic. Here I must observe, that I am very far from conceiving that many pathologists of the present day will consider every disease which prevails epidemically to be necessarily contagious. Doubtless, the particular causes which occasion epidemic maladies will greatly facilitate the diffusion, by contagion, of those which really possess that property. And it is not improbable, that some diseases, which at first originate from an epidemic influence solely, may become contagious, or rather infectious, from the circumstances in which those affected by them may be placed,—as from imperfect ventilation, previous want of, and present inattention to cleanliness,

crowding together of the sick, &c.; and may be disseminated more widely, owing to an infectious cause thus generated being superadded to the original and more prevailing causes whence these diseases at first sprung. We have proofs of such occurrences in fevers and dysentery: but the epidemic cholera appeared under circumstances which could in no way favour the idea that an infectious property was in any instance generated. There was no crowding together of the sick — no want of ventilation — no want of cleanliness; and the disease, at the time more particularly when it was most prevalent and fatal — at the early period of the epidemic, — always terminated so rapidly, either in death or in recovery, that a sufficient time did not elapse, which, if we may judge from the progress of those maladies that are acknowledgedly contagious, is indispensably requisite to the operation of those changes on the fluids and secretions whence a contagious property results. Moreover, the lapse of time between the existence of perfect health and of the full manifestation of disease was so short, that no such evidence of the intermediate changes, as exists in contagious diseases generally, could be detected in this malady. Very many, also, of those who were seized with the epidemic cholera, neither saw nor came within the sphere of any other individual affected with the disorder.

The epidemic cholera, it should also be recol-

lected, appeared simultaneously at several stations far distant from each other, leaving intermediate districts of country unaffected by it. It is true, that on several occasions, when the disease prevailed amongst the troops and inhabitants of a particular station or town, and soon after troops or others arrived in these places, many of them were attacked with the disease. I have adduced an instance of this at page 176. But it by no means follows from this circumstance, that they were seized in consequence of the communication of a contagious principle from those who were labouring under the malady; but, on the contrary, it is evident that they, having arrived in a state of predisposition, from fatigue, &c., at a district where the epidemic influence actively prevailed, were soon acted upon by this exciting cause of the disease.

The sudden occurrence of the epidemic cholera in particular stations and districts, the astonishing violence with which it appeared, the great numbers which were immediately and simultaneously seized with it, its very unexpected and quick decline, and its total disappearance after committing unheard of ravages during a few days only, are circumstances wholly incompatible with the belief that it either originated in, or was diffused by means of contagion. I have it in my power to adduce numerous facts in support of the above assertion; but as a sufficient number have

been already brought forward in the able report of Mr. Jamieson on the disease as it occurred in the districts, and amongst the troops under the Bengal Presidency, I consider it unnecessary to allude farther to them.*

In addition to the foregoing considerations, I

* The following extract from the Madras Medical Board's Returns, shews the much greater susceptibility to the disease existing in new comers to the climate, and evinces a dependence of the malady upon a certain constitution of the atmosphere. The particulars, however, connected with the appearance of the disease are not given sufficiently full to form the basis of any reasoning on the subject of its origin; yet it must be apparent, that the sudden occurrence of the disorder, the numbers simultaneously affected, and its quick disappearance, strongly support the opinion as to its dependence upon the constitution of the atmosphere, arising from electrical states, and terrestrial emanations.

" H. M. 54th Regiment landed at Madras the 10th May, 1822, and were attacked with cholera on the 13th, which continued till the 7th June; three days after they left Madras for Bangalore. It re-appeared on the 13th June in a slight degree, and ceased before they arrived at Bangalore, on the 29th June. The Regiment were 632 strong; had 159 cases of cholera, of which 53 died in the regimental hospital; 33 were left in the general hospital, Madras, and *one* died.

" At the same time, the H. C. ship, Wm. Fairlie, had 65 cases, and 12 died. The H. C.'s Ship, Thos. Coutts, about fourteen days after, had 23 taken ill of cholera, and 6 died.

" H. M. 34th Regiment encamped at the Mount, 6th May, for the purpose of drafting, were attacked with cholera the 14th May, and had 87 cases, out of which 18 died. It disappeared in June, on the arrival of the regiment at Wallajahbad.

may state, that medical officers, and attendants on the sick, were not affected by the disease in a greater proportion than other classes of persons in the districts or divisions of the army wherein the disorder was prevalent; — that individuals who were seized with cholera, from amongst

"H. M. 53d Regiment, on march from Bangalore, were attacked, above the Ghauts, on the 20th May; strength 714 men; 70 cases occurred, and 20 deaths. The disease ceased in June, on their arrival at Madras.

"H. M. 41st Regiment arrived at Madras in July 1822,— 714 strong, and were immediately attacked; they had 159 cases, and 32 deaths.

"While it raged in this manner among the Europeans who had just arrived, and were encamped or on the march, the artillery and other *Europeans* and the native troops at Madras, Poondamallee, and St. Thomas, were all exempt, and the disease was confined to the four King's regiments and the two Indiamen.

"The month of May is always very hot at Madras, generally distinguished by a clear atmosphere, and land and sea breezes: this year, however, it has not only been very hot, the thermometer ranging from 93° to 100° from the 13th to the 25th, but the sky was unusually overcast, the atmosphere hazy, wind violent and variable, chiefly south, and felt to be uncommonly heavy and relaxing. Although cholera appeared shortly after this state of weather set in, it must be observed, that the continuance of the disease seemed little influenced by atmospheric change, for it continued to prevail after the usual state of weather had been restored. Its appearance in the 41st Regiment took place under opposite circumstances. The cholera, during this period, was almost unknown amongst the population and the troops, whether Europeans or natives." — *Extract from the Medical Board, dated 2d Sept.* 1822.

those who were in the hospital for other disorders, did not appear to communicate the disease to other patients who had intercourse with them;—that when a single member of a family was attacked, the rest of that family were not more obnoxious to the disease than an equal number from amongst the community; and if more than one in a family or house were seized, it was generally simultaneously, or nearly so, and not in such a manner as would have led me to infer that the disorder had been communicated from the one to the other;—that when the disease was prevalent in a particular part of a town, in a certain street, or even in one house only, the circumstance was evidently attributable to the confined, unwholesome, and low situation of these places, or to particular predisposing or exciting causes, to which the individuals thus attacked have been exposed.*

In illustration of the above statements, I may adduce what occurred in the hospital under my charge. Indeed, both in that hospital, and during the course of my whole experience of the disease elsewhere, no more than two cases occurred to me, which the most strenuous supporters of con-

* Mr. Marshall, in his excellent work on the Medical Topography of Ceylon, observes, "that in no instance did it prevail among people residing in the same house or barrack, so as to excite a belief that the contact of the sick with the healthy contributed to its propagation," &c.

tagion in this disease could adduce in aid of their views; and these cases evidently appear to have arisen from a very different source than from contagion. The first instance was a soldier attending his wife in the disorder, who was himself seized by it, and died an hour before her. But it is evident, in this case, that both were exposed to the same efficient causes—the same epidemic influence; the fatigue and anxiety experienced by the husband whilst attending his wife, proving the determining cause of that influence, and facilitating its operation: and it is equally evident, if the husband's disorder had arisen from a contagious principle proceeding from his wife, that, like other contagions, it would have required a longer time than the very few hours which elapsed, to operate the changes necessary to its development. The next instance was that of a female who had attended her friend that died of the disease, in whom she was much interested: after washing her, and removing her from the ward, she was herself attacked. The same remark which was made as to the first instance equally applies to this. These patients were in a ward with between eighty and ninety persons, many of whom collected around their beds, and yet not one of that number was attacked with cholera.*

* Colonel Briggs, a scientific officer, states:—"I have known SEVERAL instances of a whole family being swept off in a day; and, I believe, on the Bombay side of India the medical

I never saw more, altogether, than five or six persons, whilst patients in the hospital, attacked with the epidemic cholera; and, although I have had thirty or forty cases of this disease in the hospital at one time, when it contained not fewer than from one hundred and seventy to two hundred patients, yet not one instance of cholera occurred that could be imputed to the admission of these cases.

When I took charge, in 1819, of the general hospital, fifty-nine cases of epidemic cholera were treated by me, between the 23d of May and the 23d of August. I was without assistants at the time, and obliged to be in the hospital almost constantly, both night and day, harassed and fatigued of course, and certainly liable to the operation of an infectious principle, had any such emanated from those who were suffering under the disease. But I never experienced any disorder, and only one of the hospital-servants had the disease — a degree of immunity even greater than that observed elsewhere.

men were particularly affected." This, however, does not prove the disease to proceed from contagion, but merely that persons breathing the same air were subject to the same disease.

When this officer was himself seized with the epidemic cholera, he was but little affected by spasm or sickness; but he complained much of thirst and the burning sensation at the epigastrium, which I have considered as pathognomonic of this disease.

Numerous instances may be detailed of detachments leaving stations in which the disease was prevalent, losing men in it on their route to other stations, and yet not communicating any infection to those whom they joined. This appears to be a strong circumstance in proof of the non-contagious nature of the disease. But I must also contend, that if the disease had even appeared amongst the troops which these detachments joined, the occurrence cannot be considered as by any means proving its contagious nature. The circumstance merely would have evinced, that the period at which the efficient cause of the epidemic came in operation, coincided with the arrivals of these detachments.*

As the non-contagious nature of the disease is very generally admitted by the medical authorities of India who have had sufficient experience of the disease, and as this property is generally believed in by the community at large,† I should

* Cholera attacked the field force stationed at Malligaum in Kandiesh, and raged with great violence among the corps posted on the left of the line; while the 17th battalion of native infantry, who were posted on the right of the line, were exempt from it, notwithstanding they had continued communication with the other men. But, although they were exempt from the disease while they remained in this position, they suffered very much from cholera on their march from Malligaum to join Major-General Sir John Doveton's force in the Ellichapoor Valley.

† It may be thought singular that I should adduce vulgar

not have thought it necessary to advert to a contrary opinion, had not that opinion received the support of some distinguished medical authorities. I cannot, however, but think it unfortunate that the idea was ever suggested, because the dread of contagion may lead to serious consequences; inasmuch as it may withhold from the sick that assistance which they so much require. The strongest proof which I can adduce in opposition to it, came fully under my own experience, which has not been inconsiderable, and was derived chiefly from what I observed in the general hospital at Madras, whilst it was under my charge. This hospital generally contained from 170 to 200 patients, natives and Europeans; the wards were open, and a free communication existed between them; and yet, although patients were daily brought into them suffering under the epidemic cholera, although these patients were indifferently distributed throughout the hospital, and consequently not secluded from the rest of its inmates, no more than five or six persons,

opinion in support of my argument on this topic; but I believe that enlarged views of the sentiments of the public, on matters of this description, will shew that they generally form opinions which tolerably approach to truth; and that if they at all err on a question like the present, or upon the infectious nature of a disease, it will generally be on the side of affirmation. The "catching" property of a disorder will be that inferred by them, whenever the question admits of much doubt or discussion.

exclusive of the two already noticed, were seized with the disease while patients in the hospital, during a period of five years; and certainly these cases could not be imputed in any degree to contagion. I can view them merely as cases of cholera, occurring under circumstances of predisposition, during the prevalence of an epidemic cause, and as shewing even a much diminished ratio of attack to that observed where the disease prevailed.

Since the appearance of the first edition of this work, Dr. Kennedy, of the Bombay Medical Establishment, has published his opinions respecting the epidemic cholera, and argued that the disease is dependent upon concussion of the brain, and that it is contagious. But although he has laboured in adducing various analogies in support of the opinion that concussion of the brain is followed by a train of phenomena similar to those characterising this disease, he has not explained in what manner the contagious principle, admitting such to exist, occasions concussion of this organ. As to the proofs which he has adduced in support of his opinions of its contagious properties, they seem altogether quite as well calculated to shew its origin in some peculiar state of the atmosphere, resulting from its electrical condition and from terrestrial exhalations, and to admit of explanation accordingly. It should also be recollected, that the dread of the

disease, which prevailed upon its appearance in any particular locality, and which seized upon many who witnessed the disease in others, was of itself calculated to predispose the constitutions of many to become affected by the particular state of the atmosphere occasioning it, and thus actually to favour the idea of its contagious properties.

I shall now conclude with a few brief remarks on what seems to me to be the best preservative regimen that can be adopted, in order to avoid an attack of the epidemic cholera. All that I can, however, say under this head, may be comprehended under the general injunction, of avoiding the predisposing and exciting causes of the disease. Whatever tends, directly or indirectly, to debilitate or fatigue the system; whatever lowers its vital energy—as excesses of every description— disposes to the operation of the efficient cause of the malady. On the other hand, I am fully persuaded, that whatever tends to preserve this energy, serves to render the system impregnable to its operations.

Exposure to cold, to chills, to the night-dew, and to wet and moisture, ought carefully to be avoided; and if at any time these exposures are inevitable, the system should be fortified against their effects: but the mode of fortifying the

system requires consideration. This should not be attempted, unless better means are not within reach, by wines or spirits; these generally leave the system, as soon as their stimulating effects have passed off, more exposed than before to the invasion of disease. Permanent tonics, however, and those more especially which determine to the surface of the body, at the same time that they improve the tone of the digestive viscera, and promote the regular functions of the bowels and biliary organs, may be resorted to on such occasions. For this purpose, infusion or decoction of bark, or of calumba, may be taken with the spiritus mindereri, or any warm stomachic; or the powdered bark may be exhibited, combined with the spicy aromatics. The same medicinal means may be also attended to, whenever the disease prevails at the place where the individual resides, and should be put in practice when he retires to sleep, and as soon as he rises in the morning, before he leaves his apartment. He should avoid, also, sleeping in low and ill-ventilated apartments; and be equally distrustful of sleeping near, or even of passing through, in the night time, marshy or swampy districts. If, however, these latter precautions cannot be taken, the medicinal means already suggested should be adopted.

The bowels should be attended to, and their functions regulated; but in no case should this be attempted by debilitating purgatives, or by

salts. The warm stomachic laxatives, and these combined with tonics, may be adopted with advantage, as occasion may require. The surface of the body should be kept in a warm perspirable state; but excessive perspirations must be avoided.

The diet should be regular, moderate, and easy of digestion. Whilst low living ought to be shunned, its opposite should never be indulged in. The stomach ought to have no more to do than what it can perfectly accomplish, without fatigue to itself, and to the promotion of its own energies. It must never be roused to a state of false energy, by means of palatable excitants, or weakened by distending it with too copious draughts of weak diluents.

The state of the mind ought to be regulated in such a manner, as not to be excited much above, or lowered beneath, its usual tenour. The imagination should not be allowed, for a moment, to dwell upon the painful considerations which the disease is calculated to bring before the mind; and least of all ought the dread of it to be encouraged. There is a moral courage, which is possessed by individuals who are even the weakest, perhaps, as respects physical powers, and which in them resists more efficiently the causes of intertropical diseases, than the bodily powers of the strongest, who are not similarly endowed with this species of mental energy.

Those who dread not the attack of disease, more especially of epidemic diseases, and who yet possess sufficient prudence to avoid unnecessary exposures to their predisposing and exciting causes, may generally be considered as subjected to comparatively little risk from them. This, I am persuaded, is particularly the case as respects epidemic cholera, and I wish to impress it upon the minds of those whom the observation concerns.

Admissions and Casualties from Cholera, in the Army of Fort St. George, both Europeans and Natives.

EUROPEANS.

YEARS.	Total Strength of the Army.	Total Admission of Cholera.	Rate Per Cent of Admission upon the Strength.	Total Number of Deaths.	Rate Per Cent of Deaths upon the Admissions	Rate Per Mille of Deaths upon the Strength.
1818	10,652	1087	10⅌cent.	232	21⅌cent.	21 ⅌ mille.
1819	10,125	500	5	85	17	8 ......
1820	9,416	343	4	69	20	7 ......
1821	9,553	357	4	39	11	4 ......
Grand Total	39,746	2287	6	425	18	10 ......

NATIVES.

YEARS.	Total Strength of the Army.	Total Admission of Cholera.	Rate Per Cent of Admission upon the Strength.	Total Number of Deaths.	Rate Per Cent of Deaths upon the Admissions	Rate Per Mille of Deaths upon the Strength.
1818	58,764	2496	4⅌cent.	664	26⅌cent.	10 ⅌ mille.
1819	63,782	2684	4	734	27	11 ......
1820	76,870	3178	4	758	24	10 ......
1821	82,046	2527	3	830	33	10 ......
Grand Total	281,462	10,885	4	2986	27	10 ......

PART II.

TOPOGRAPHICAL AND STATISTICAL

REPORTS

OF THE DISEASES MOST PREVALENT IN THE
DIFFERENT STATIONS AND DIVISIONS

OF

THE ARMY UNDER THE MADRAS PRESIDENCY.

REPORTS, &c.

The object of the following Reports is to shew, in as condensed a form as possible, the several diseases which were prevalent, at different periods of the year, in each division of the army; to give a sketch of the medical treatment required; and to exhibit the degree of mortality which prevailed during the period embraced by these statements. I have added some observations on the nature of the climate, and on the comparative effects of disease upon the constitutions of the Europeans and natives, of the same military class, subject to the same duties, and exposed to similar vicissitudes.

That something of this kind may be highly beneficial to the public service, will be readily admitted by all who are acquainted with the medical practice of India; and that it has not been before attempted by those who have long had possession of the necessary documents, must be a matter of regret to medical officers arriving in the country, and who, being strangers to its climate, are in some measure ignorant of the peculiarities of its diseases, as observed in its different localities. This has induced me to

contribute my individual efforts, however imperfect they may be found, to supply the deficiency.

The occasional publication of Reports similar to those which I am now about to attempt, may lead the way to an investigation of diseases otherwise imperfectly known to the mass of the medical community; and, by extending the knowledge of the military surgeon, may become the means of preserving many valuable lives that might otherwise be lost to the service. It is not an unfrequent occurrence, that corps are suddenly ordered into countries wherein the medical officer can have had no previous experience, and where the prevailing diseases differ materially from those he may have been in the habit of treating. Having no experienced guide, therefore, to guard him against the causes of disease prevalent in the district he is about to visit, or to direct him in the treatment which has been found most successful in combating their effects, he must feel at a loss, till time and observation put him in possession of what recorded experience might have at once furnished him with. Such has been my lot. I have often and painfully felt the difficulty of which I now complain, and had long since determined to remedy the inconvenience as far as might be in my power, if ever I could collect materials for the purpose, being *well aware*, that, by assisting the medical officer in the performance of his duties, I should benefit

the public service, and promote the cause of humanity.

The publication of the returns made by the Medical Board at Madras, though extremely defective in many points, has given me the opportunity I have so long desired, and from those returns I have formed the following statements.

The present Reports, though they may not, perhaps, be critically correct, will at least prepare the way for better information; and until that is procured, they will serve to direct the attention of the regimental surgeon to the diseases he is likely to meet in the several countries belonging to the Madras Establishment, while they will enable the government to provide for the comfort of their troops, and thus, perhaps, to prevent many of the evils that exist at present.

The period from 1815 to 1821, inclusive, having been that of the most active service which has occurred in India for many years past, has, therefore, been selected for these Reports, as it was the best calculated to try the constitution of the troops. During this time, the country was the seat of war, and the troops were obliged to make most harassing marches, and to perform the severest duties of an active warfare. They were exposed to epidemic cholera, which prevailed the greater part of this time, to the influence of seasons more than usually variable, to

excessive heat, heavy monsoons, and sudden vicissitudes of weather.

During this period, too, the army traversed a space of country from between the 8th and 9th to the 25th degree of north latitude, and from the 75th to the 80th degree of east longitude.

It was my good fortune to be with the army during the whole of this time, as a regimental, a staff, and a superintending surgeon, successively: I had, therefore, such opportunities as fall to the lot of few, of collecting information, and I now offer a concise abstract of the result of them, with deference to the public, with a view of leading to farther investigation, and not with a feeling that they possess any other merit than that which a devoted zeal to forward the interests of the public service, and the cause of humanity, can give them.

I cannot but think, however, that if similar statements were made and followed up, from time to time, by others, at the sister Presidencies, a mass of highly valuable information regarding the climate and diseases of India might be collected, which would be the means of establishing medical practice upon a rational footing. That this is imperiously called for, must be at once admitted, when we consider that, extraordinary as it may seem, there is at the present moment as much diversity of opinion respecting the treat-

ment of the diseases of India as there was fifty years ago: and this is the more singular, as the diseases have not increased in number, and they are certainly not numerous.

The various situations of importance which I have held in the service, have enabled me to enter upon a work of this kind with some confidence, having had the opportunity of personal observation, in every important station and district under the Madras Presidency; and having had the direction of very large establishments, both European and native, and the superintendence of general hospitals, both in field and in garrison quarters.

GENERAL EXPLANATION

OF THE SUBJOINED

TABLES OF DISEASE.

There is so great a difference between the number of actual admissions into hospital, and the number of cases in the accompanying Tables of disease, that some explanation appears to be necessary: I must, therefore, state, that in the Tables published by the Medical Board of Madras, on which these statements are founded, the number remaining at the end of one month is added to the admissions of another, *i. e.* the sick who remain on the 31st of January are added to the admissions in February; and this mode of calculation is carried on from month to month, and from year to year, through the whole period of six years. The number of cases, therefore, which will correspond with the total column of admissions, is immensely increased, when compared with the actual number received into hospital.

I shall consider the total column of admissions, therefore, as nominal numbers; because it must appear manifest, that to add the remaining of the preceding to the admissions of succeeding months, although necessary in an hospital return, to shew the number in hospital at all times, must prove a fallacious guide in giving the state of sickness of corps or stations for any given period. For instance; a man may be six months in hospital, which will give six remaining for one admission; and suppose ten men should remain in hospital for six months, there will be, at the end of six months, sixty remaining for ten actual admissions: hence the numbers increase far beyond the true rate of sickness.

The number of diseases in the Tables published by the Medical Board, being carried on in this way from the total column of remaining and admissions, renders it impossible to separate the list, so as to make it correspond with the number of real admissions into hospital. I have, however, endeavoured to make a reduction from the nominal to the absolute number of sick admitted; and although the calculation may not bring the two to exact correctness, it will come nearer the mark, and shew more distinctly the real proportion of disease as it affects the European and native constitution, than if the calculation had not been made.

There are many other inaccuracies in the Medical Board's returns, probably from the carelessness of transcribers, but which I have no means of correcting, though they must, of necessity, prevent the possibility of these statements corresponding precisely in all their parts: to make this matter, therefore, clear, I affix the Medical Board's returns for one year, which will explain in what manner the patients remaining of the preceding, and those admitted of the succeeding month, are blended together. The following statement will shew the numbers in the total column of admissions to be nearly double the number of men actually admitted into hospital.

In the returns of the Medical Board, the total of the column of admissions into hospital, for the Presidency Division alone for six years, consists of

		Total.
Europeans	38,070	68,669
Natives	30,599	

when, in point of fact, the real admissions were

Europeans	17,912	36,649
Natives	18,737	
	Difference......	32,020

In computing the number of sick under medical treatment in January, 1815, the number

admitted during that month is added to that remaining on the 31st December, 1814. I have, besides, added up the column of real admissions alone, which ought to give the exact number received into hospital for the period of six years.

TABLE I.—Extract from the Medical Board's Returns for the PRESIDENCY DIVISION, *for the Year* 1815.

	Remained.		Entered.		Total.		Dysentery.		Diarrhœa.		Fever.		Hepatitis.		Ophthalmia.		Rheumatism.		Ulcers.		Venereal.		Other Diseases.		Cured.		Dead.		Transferred.		Remaining.		Strength.	
	Europeans.	Natives.	Europeans.	Natives.	Europeans.	Natives.	Europeans.	Natives.	Europeans.	Natives.	Europeans.	Natives.	Europeans.	Natives.	Europeans.	Natives.	Europeans.	Natives.	Europeans.	Natives.	Europeans.	Natives.	Europeans.	Natives.	Europeans.	Natives.	Europeans.	Natives.	Europeans.	Natives.	Europeans.	Natives.	Europeans.	Natives.
For Jan... .	220	247	223	394	443	641	99	23	1	22	49	176	76	1	8	13	26	85	14	34	69	67	101	220	229	383	8	7	3	0	203	215	1685	6702
Feb....	194	162	194	199	388	361	81	11	1	12	42	67	58	4	6	3	29	65	14	18	60	50	97	131	179	161	6	2	1	0	202	198	1205	4442
March	202	190	212	190	414	388	80	6	1	9	38	71	64	6	3	5	34	65	15	12	78	60	101	154	216	195	12	4	16	0	170	189	1167	4494
April	172	188	223	152	395	340	60	3	3	9	45	57	46	4	7	4	28	49	89	55	14	12	103	147	231	186	6	4	1	0	157	150	1158	4611
May...	154	148	253	171	407	319	64	4	4	8	60	39	36	2	7	5	28	25	19	17	96	75	93	144	204	143	8	1	0	0	195	175	1160	4692
June	201	191	263	267	464	458	75	15	4	7	58	86	44	2	7	7	32	71	25	22	96	100	123	148	244	203	7	1	1	12	212	242	1456	5953
July...	205	223	330	328	535	551	93	20	5	13	68	139	49	1	15	9	31	64	31	27	93	99	150	179	259	288	8	3	0	0	268	260	1796	5467
August	165	257	243	294	408	551	87	27	4	11	59	144	36	1	44	22	23	75	28	40	37	90	90	141	175	281	18	8	13	1	202	261	1432	5888
Sept...	195	211	221	233	416	444	87	15	4	16	47	116	46	1	62	13	16	58	34	23	33	72	87	130	160	220	7	2	0	0	249	222	1339	4575
Oct....	249	222	318	354	567	576	133	11	20	21	54	210	59	3	83	23	25	51	33	26	52	85	108	146	239	345	11	4	0	0	317	227	1520	5545
Nov....	314	225	246	293	560	518	115	19	31	17	54	147	58	1	85	8	28	66	32	25	71	76	86	159	233	293	16	5	0	0	311	220	1531	5746
Dec....	309	218	291	274	600	492	129	22	18	15	70	135	75	1	76	9	35	43	27	29	71	65	99	173	255	295	13	3	7	0	325	194	1523	5778
G. Total ...	2560	2490	3017	3149	5597	5639	1103	176	96	130	644	1387	647	27	403	121	335	717	361	328	770	751	1238	1872	2624	2993	120	44	42	13	2811	2589	16972	63893
Remained 1st Jan			220	247																														
			3237	3396																														

N. B.—In this Return it will be found that the remaining of one month is added to the admissions of another, which makes the total column of admissions considerably more than the actual number received. In the above Table I have added up the column of admissions alone, to which I have added the number in the hospital on the 1st January, 1815; which total amount for one year is 3237 Europeans, and 3396 Natives, instead of 5597 and 5639. See the general explanation of the Tables at p. 230, *et seq.*

TABLE II.—*Abstract of Diseases of the* PRESIDENCY DIVISION *of the Army for a Period of Six Years, from* 1815 *to* 1820, *inclusive.*

Europeans Admitted into Hospital.	Natives Admitted into Hospital.	Total Admitted in six Years.	Europeans Cured.	Natives Cured.	Total Cured in six Years.	Europeans Transferred.	Natives Transferred.	Total Transferred in six Years.	Europeans Dead.	Natives Dead.	Total Dead in six Years.	Remaining.
17912	18737	36649	16402	17550	33952	266	50	316	738	551	1289	1092

The European Force never exceeded 1486
The Natives never exceeded........... 5130

Europeans cured .... 91 per cent.
Natives ditto.................... 93 per cent.

DISEASES.	Nominal Admissions.			Remains of the Nominal Admissions.			Actual Admissions.			Per Centage of Diseases upon the Effective Strength.	
	Europeans.	Natives.	Total.	Europeans.	Natives.	Total.	Europeans.	Natives.	Total.	Europeans.	Natives.
Fever.............	4892	7240	12132	2593	2810	5403	2299	4430	6729	$30\frac{4}{10}$ per cent.	$16\frac{6}{10}$ per cent.
Hepatitis	4156	95	4251	2203	37	2240	1953	58	2011	$25\frac{8}{10}$	$\frac{2}{10}$ ......
Dysentery	7586	843	8429	4021	328	4349	3565	515	4080	$47\frac{2}{10}$	$1\frac{9}{10}$ ......
Diarrhœa	1314	1078	2392	697	419	1116	617	659	1276	$8\frac{1}{10}$	$2\frac{4}{10}$ ......
Venereal	4298	3356	7654	2278	1303	3581	2020	2053	4073	$26\frac{7}{10}$	$7\frac{7}{10}$ ......
Cholera	129	424	553	69	165	234	60	259	319	$\frac{7}{10}$	$\frac{9}{10}$ .....
Ulcers	1906	1874	3780	1011	728	1739	895	1146	2041	$11\frac{6}{10}$	$4\frac{3}{10}$ ......
Rheumatism . .	2832	3647	6479	1501	1416	2917	1331	2231	3562	$17\frac{6}{10}$	$8\frac{3}{10}$ ......
Ophthalmia......	2349	534	2883	1245	208	1453	1104	326	1430	$14\frac{6}{10}$	$1\frac{2}{10}$ ......
Other Diseases	8608	11508	20116	4563	4466	9029	4045	7042	11087	$53\frac{5}{10}$	$26\frac{4}{10}$ ......
Grand Total ...	38070	30599	68669	20181	11880	32061	17889	18719	36608		

Total Strength of the Force, during these six years, were Europeans .	7553
Total Strength of the Force, during these six years, were Natives.....	26598
The proportion of Sickness amongst the Europeans, per cent...........	217
The proportion of Sickness amongst the Natives, per cent	70
The proportion of Deaths amongst the Europeans, per cent..........	9
The proportion of Deaths amongst the Natives, per cent........	2

PRESIDENCY DIVISION.

Station.—The Presidency Division includes Madras, St. Thomé, and St. Thomas's Mount.

Climate.—The general state of climate in the Carnatic is dry and hot. The range of thermometer is, at Madras, from 75° to 92°; but sometimes in the months of May and June, it ranges as high as 98° or 105°. I consider February, March, and April, while the southerly winds blow, the most disagreeable period of the year. The hot, windy season of May, June, and July, is generally the most healthy; and I think the greatest degree of sickness prevails about the commencement of the monsoon, or from August to November. Sometimes the sickness is greatest in December and January, and at other times in June and July: but, in general, the most sickly period is that which I have already noticed.

Prevailing Diseases.—The more prevalent and destructive maladies are, fever, dysentery, and hepatitis; but I consider fever to be the most frequent disease in this division. Dysentery is also very prevalent; but it seems to depend more upon contingent circumstances

than on the climate; such as irregular living, hard drinking, and, probably, exposure to the sun.

The great number of liver cases that are found in the returns of the Presidency Division, I conceive partly to be owing to the practice that exists, of sending chronic cases of liver complaint from out-stations to the Presidency General Hospital.

This circumstance appears to me to account in some measure for the cases of liver disease being twenty-five per cent at the Presidency, while they are only fifteen and thirteen in the centre and southern division, and from five to twenty-two per cent in all other divisions of the army. Hepatitis should not, therefore, be considered as a disease altogether resulting from the climate of the stations of this division.

Symptoms and treatment of prevailing Diseases.—As the climate of the Presidency, Centre, and Southern Divisions is precisely alike, and the prevailing diseases the same, I shall treat them generally under the head of Diseases of the Carnatic; and for the sake of distinction, I shall call the Carnatic all that space of country situated between the western hills, and the coast which extends north and south, from Cape Comorin to the Kisthna River.

The form of fever which prevails in the Carnatic nearly resembles that called by Cullen

synocha—continued inflammatory fever. It is characterised by full, hard pulse, hot skin, suffused eyes, headach, and general pains ; but it is easily checked, if immediately and boldly treated. I attach great importance to this fever being attacked without loss of time, as its progress may then be stopped in a few hours, and fatal lesions prevented from supervening in the liver, bowels, or brain.

Bleeding, either general or local, or both, according to circumstances, will always be attended with benefit, and should never be lost sight of in this fever. The apprehension that the loss of blood is not rapidly repaired in India, is, I fear, a fatal error. Such an opinion cannot be maintained upon any just principle, but is derived from prejudices against depletion, arising from erroneous preconceived notions which exist in a great degree even amongst those whose field for practice has been considerable. The dread of active depletion, and of its consequences, especially as it is sometimes encouraged by men high in office and in power, cannot fail to paralyse the hands of medical men on their first arrival in India, and serve to lay the foundation of erroneous notions of practice. The sooner, therefore, the prejudice is pointed out, the better, as candid and enlightened observation cannot fail of leading to the adoption of juster views.

Bleeding, I consider, in the first instance, as

the sheet-anchor in the treatment of this disease, and, when followed up by active purgation, will, probably, in a few days remove it. But purgatives should, nevertheless, be prescribed as long as there is any degree of excitement in the system, and as long as the dejections are viscid, of a dark colour, or otherwise morbid. If local affections, either of the head, liver, or bowels, manifest themselves during the progress of the fever, they must be promptly combated by means of local depletions, counter-irritation, and the exhibition of purgatives and sudorifics. If the disease have gone on to exhaustion of the energies of life, as indicated by typhoid or adynamic symptoms, bark, and the usual stimulants and tonics, must be administered, either in combination or alternated with purgatives or aperients. When the alvine secretions are improved, or becoming healthy, an alterative course of medicine may then be had recourse to with the best effects.

I have frequently known an emetic check the fever at once, particularly amongst the natives: and if it be given in an early stage, I have not a doubt that, amongst them, the tartar emetic mixture will rapidly effect a cure; but it *must* be exhibited in the early period of the fever; because, when the disease is neglected, even for a day or two, which is often the case, it becomes of a very different character, especially amongst the natives, and assumes a form not unlike

typhus, which is indicated by black, foul tongue, stupor, low and languid pulse, &c. &c., without possessing, however, the specific character of contagious typhus, as described by Cullen. We have no disease of this latter kind in India; but as the symptoms, with this exception, partake very much of the typhoid character, I am at a loss to know what else they should be called.

The tartar emetic mixture which I have generally prescribed, consists merely of six grains of tartrate of antimony dissolved in a quart of water. A wine-glassful taken every ten or fifteen minutes will prove an emetic; if taken every two or three hours, it will be purgative; and every five or six hours, sudorific; in either of these ways it may be given, according to circumstances. I have scarcely ever known it fail to check the progress of the fever in natives, when had recourse to soon after the attack of the disease, with a view of producing its emetic and purgative effects, and continued for two or three days subsequently as a sudorific.

Amongst the natives, this disease should be narrowly watched, and quickly opposed; because, if it be not at once removed, it generally terminates in exhaustion of the powers of life, or disorganisation of some of the internal viscera, and hence the patient is either liable to linger under chronic visceral obstructions, which will render him unfit for service, or he may at once fall a

sacrifice to its violence. It is worthy of remark, that, while the fevers prevalent in the northern Circars, Mysore, and in all other stations above the Ghauts, terminate in obstinate intermittents, this form of fever, which is that most prevalent in the Carnatic, if neglected or badly treated, terminates invariably, as far as my experience serves me, in exhaustion of the energies of life, and in those symptoms which mark the last stage of typhus. When the case proves fatal, the patient dies in low muttering delirium, and in the state usually characterising adynamic or malignant fever.

Upon the *post-mortem* examination of the fatal cases, inflammatory states of the brain and its membranes with effusions of serum, diseased conditions of the liver with congestion in the blood-vessels and biliary ducts, and softened, inflamed, or ulcerated states of the mucous surface of the alimentary canal, particularly of the intestines, are the appearances which are usually present.

Proportion of Sick.—Natives do not appear to suffer in the same proportion here as in some other divisions, though they do so in a greater degree than in the Centre, Southern, or Northern Divisions, the Ceded Districts, or Travancore. The cures are equal to those in Travancore, less than those in the Centre and Southern Divisions and Ceded Districts; and the deaths

are the same as in the Centre and Southern Divisions, Ceded Districts, and Nagpore.

It appears that the proportion of sickness and deaths amongst the European troops is greater in this division than in any other in the army, while the cures are equal to those in the Northern Division, Ceded Districts, Hyderabad, and Nagpore; but less than those in the other divisions, with the exception of the field force.

This may be accounted for, with regard to Europeans, by the circumstance, that all bad or lingering cases are sent from out-stations of the army to the Presidency General Hospital. It will appear, however, from the returns of the Centre and Southern divisions, that there are more Europeans admitted into hospital in the Carnatic, generally, than in the northern Circars, or at any of the stations above the Ghauts, with the exception of Nagpore.

Number of Troops composing each Division and Station.—At Madras there are generally one European regiment, a company of artillery, and about four battalions of native infantry. At the Mount, there are two battalions of European artillery; and although St. Thomé is not a military station, yet it is a place to which sick officers usually come from out-stations.

TABLE III.—*Abstract of Diseases of the* SOUTHERN DIVISION *of the Army, for a Period of Six Years, from* 1815 *to* 1820, *inclusive.*

Europeans Admitted into Hospital.	Natives Admitted into Hospital.	Total Admitted in six Years.	Europeans Cured.	Natives Cured.	Total Cured in six Years.	Europeans Transferred.	Natives Transferred.	Total Transferred in six Years.	Europeans Dead.	Natives Dead.	Total Dead in six Years.	Remaining.
11036	23172	34208	10475	22042	32517	81	23	401	325	957	1282	305

The European Force never exceeded... 1222
The Natives never exceeded 7877

Europeans cured .... 94 per cent.
Natives ditto.................... 95 per cent.

DISEASES.	Nominal Admissions.			Remains of the Nominal Admissions.			Actual Admissions.			Per Centage of Diseases upon the Effective Strength.	
	Europeans.	Natives.	Total.	Europeans.	Natives.	Total.	Europeans.	Natives.	Total.	Europeans.	Natives.
Fever	2913	12119	15032	1120	5313	6433	1893	6806	8699	$28\frac{3}{10}$ per cent.	18 per cent.
Hepatitis...... ..	1392	50	1442	498	22	520	894	28	922	$13\frac{3}{10}$	$\frac{1}{10}$ ......
Dysentery	3496	1256	4752	1224	541	1765	2272	715	2987	$33\frac{9}{10}$	$1\frac{8}{10}$ ......
Diarrhœa	525	1207	1732	184	620	804	341	687	1028	5	$1\frac{8}{10}$ ......
Venereal	2834	3399	6233	792	1462	2254	1842	1937	3779	$27\frac{5}{10}$	$5\frac{1}{10}$ ......
Cholera	414	1287	1701	145	554	699	269	733	1002	4	$1\frac{9}{10}$ ......
Ulcers	735	5301	6036	258	2300	2558	477	3001	3478	$7\frac{1}{10}$	$7\frac{9}{10}$ ......
Rheumatism	993	4412	5405	351	1908	2259	642	2504	3146	$9\frac{6}{10}$	$6\frac{6}{10}$ ......
Ophthalmia	757	673	1430	265	290	555	492	383	875	$7\frac{3}{10}$	1 ......
Other Diseases	4171	10835	15006	1460	4660	6120	2711	6175	8886	$40\frac{6}{10}$	$16\frac{3}{10}$ ......
Grand Total	18230	40539	58769	6297	17670	23967	11833	22969	34802		

Total Strength of the Force, during these six years, were Europeans .	6688
Total Strength of the Force, during these six years, were Natives......	37753
The proportion of sickness amongst the Europeans, per cent............	165
The proportion of sickness amongst the Natives, per cent	61
The proportion of Deaths amongst the Europeans, per cent............	4
The proportion of Deaths amongst the Natives, per cent	2

SOUTHERN DIVISION.

Stations.—The principal stations in the Southern Division, are Trichinopoly, Dindigul, and Pallamcottah. The minor stations are Tanjore, Madura, Ramnad, Negapatam, Coimbatore, Sankerrydroog, and Salem. There are also some other small posts near the Western Ghauts, and towards Cape Comorin.

Climate.—The weather is similar to that which is experienced in the Centre and Presidency Divisions. January and February are healthy months. I consider the most sickly period to be March and August.

Prevailing Diseases.—*Fever* and *dysentery*, as in other divisions of the Carnatic, are the most prevalent and destructive diseases; but dysentery I consider as depending very much upon irregular habits: for instance, drinking spirituous and intoxicating liquors, exposure to the sun and to the night-air.

Proportion of Sick.—The proportion of sickness in this division amongst Europeans, is less than it is in either the Presidency or Centre Division; the cures being greater, and the deaths fewer. Amongst the native troops, the admissions, cures, and deaths, are equal.

Number of Troops composing Division and Station. — At Trichinopoly, during the period of this statement, there were a European regiment, three or four battalions of native infantry, and half a company of artillery; at Dindigul, a native battalion; at Pallamcottah, a native battalion; and at the minor stations, three, four, or five companies of natives, detached from the principal stations.

Table IV.—Abstract of Diseases of the Centre Division *of the Army for a Period of Six Years, from* 1815 *to* 1820, *inclusive.*

Europeans Admitted into Hospital.	Natives Admitted into Hospital.	Total Admitted in six years.	Europeans Cured.	Natives Cured.	Total Cured in six years.	Europeans Transferred.	Natives Transferred.	Total Transferred in six years.	Europeans Dead.	Natives Dead.	Total Dead in six years.	Remaining.
16649	20341	36990	15245	19420	34665	581	234	815	621	568	1189	321

The European Force never exceeded 2007
The Natives never exceeded 7551

Europeans cured .... 92 per cent.
Natives cured .... 95 per cent.

DISEASES.	Nominal Admissions.			Remains of the Nominal Admissions.			Actual Admissions.			Per Centage of Diseases upon the Effective Strength.	
	Europeans.	Natives.	Total.	Europeans.	Natives.	Total.	Europeans.	Natives.	Total.	Europeans.	Natives.
Fever	4050	8946	12996	1620	3400	5020	2430	5546	7976	27 5/10 per cent.	16 6/10 per cent.
Hepatitis	2254	100	2354	902	38	940	1352	62	1414	15 3/10	1/10 ......
Dysentery	5605	1251	6856	2242	481	2723	3363	775	4138	38 1/10	2 3/10 ......
Diarrhœa	497	861	1358	199	328	527	298	533	831	3 3/10	1 5/10 ......
Venereal	2832	2332	5164	1133	887	2020	1699	1445	3144	19 2/10	4 3/10 ......
Cholera	724	1115	1839	290	424	714	434	691	1125	4 9/10	2 ......
Ulcers	2027	2006	4033	811	763	1574	1216	1243	2459	13 7/10	3 7/10 ......
Rheumatism...	1613	3360	4973	646	1277	1923	967	2083	3050	10 9/10	6 2/10 ......
Ophthalmia ...	1505	579	2084	602	221	823	903	358	1261	10 2/10	1 ......
Other Diseases	6597	12828	19425	2639	4875	7514	3958	7953	11911	44 9/10	23 8/10 ......
Grand Total...	27704	33378	61082	11084	12694	23778	16620	20689	37309		

Total Strength of the Force, during these six Years, were Europeans . 8813
Total Strength of the Force, during these six Years, were Natives ... 33338
The proportion of Sickness amongst the Europeans, per cent 188
The proportion of Sickness amongst the Natives, per cent 60
The proportion of Deaths amongst the Europeans, per cent 7
The proportion of Deaths amongst the Natives, per cent 2

CENTRE DIVISION.

Stations.—The principal stations in the Centre Division, are Vellore, Arcot, Wallajahbad, Poonamallee, Nellore, and Ongole.—The minor stations, Chingleput and Chittoor, where two or three companies of natives are usually stationed.

Climate.—The most sickly periods of the year are the same as in the Presidency Division, and the thermometer ranges alike in all these; but I think the heat is more felt and more distressing than at the Presidency. I know not whether this feeling of a higher temperature arises from want of the sea-breeze, which prevails at Madras; or from a want of the better kind of buildings, which there afford more protection from the sun. I do not, however, think any difference of temperature whatever is experienced at any of these stations by those exposed to the open sun, which is the case with the European soldiery.

Prevailing Diseases.—*Fever* and *dysentery* are the most prevailing diseases in this division, more particularly the latter, which is one of the most destructive amongst the troops in India, and particularly so in the European constitution. It prevails in a greater or less degree in every

division of the army where European troops are stationed, but it is much more prevalent in this.* I shall therefore treat of it amongst those of the Carnatic, where there are generally more European troops than in either of the other divisions of the army.

This disease may be divided into two varieties, viz. acute and erythematic.

The first is acutely inflammatory, and if not checked by bold and decided practice, will very soon terminate fatally, or lay the foundation for that chronic stage of dysentery which disables so many men, and is the cause of the great number of discharges annually from the service.

Dysentery amongst the soldiery in India arises unquestionably more from irregularity and diet than climate; though I admit that, in some instances, the latter cause is often very intimately connected with the production of the disease, especially when the dysentery is associated with organic or functional derangement of the liver.

* But more so in the Carnatic, Hyderabad, and Ceded Districts: viz.

Carnatic	37 per cent.
Hyderabad	36 per cent.
Ceded Districts	30 per cent.
Field Force	24 per cent.
Nagpore	24 per cent.
Mysore	22 per cent.
Travancore	16 per cent.
Northern Division	12 per cent.

The sick-list of a regiment is always increased after pay-day, and dysentery is the general disease.

The symptoms of the acute form of dysentery are usually well marked: severe pain in the bowels; straining; full, strong pulse; foul, loaded tongue; motions very frequent, and small in quantity; sometimes consisting of morbid, offensive matter, but generally, in the first instance, of mucus with blood; and it is not unusual to see very considerable discharges of blood from the bowels. Upon examining the abdomen, a very considerable fulness and tension, with great tenderness, are observed, and particularly at the caput cæcum and sigmoid flexure of the colon; the tongue is sometimes white and dry, and the pulse quick, small, and irritable, with general febrile excitement.

The chief causes of dysentery, as observed in this part of India, being very nearly the same as those of fever and hepatitis, the treatment must be, in many respects, also the same. Dysentery is a disease that requires great decision in the treatment, because much is to be done in a few hours; and if it be not got under control in that time, the patient is frequently either lost, or the basis of a broken constitution is laid; and ulceration, thickening, or contractions of the colon produced.

With respect to the appearances usually observed upon the *post-mortem* examination of fatal cases, I may remark, that they consist almost

entirely of inflammation, or some of its consequences, in some part, or in the whole, of the large bowels, and occasionally in some of the adjoining viscera also. The cæcum, sigmoid flexure, and rectum, as well as the whole colon, are more or less inflamed, ulcerated, sphacelated in some parts, thickened or contracted in others, and adherent, on the peritoneal surface, to the adjoining viscera, owing to the extension of the inflammation and ulceration to the external tunic of the bowel. Sometimes the ulcerations have completely perforated the coats of the intestine, and allowed its contents to escape into the peritoneal cavity. In some cases, particularly in those complicated with disease of the liver, the small intestines are also inflamed, especially in their mucous surface; and the lower portion of the ileum is occasionally ulcerated. These are the most uniform morbid appearances, and, although the advanced condition or consequences of the disease, fully indicate the kind of treatment which is imperatively required to remove it.

The indications of cure are, to diminish general vascular excitement, to remove acrid and accumulated matter from the bowels, to allay the irritation of these viscera, and to restore them to healthy action. As this disease is entirely confined to the large intestine from the cæcum to the rectum, attention should be directed to that particular seat; and therefore emollient injections

should be used frequently, to clear away any matter that may lodge in it. Leeches should be applied in the course of the colon, particularly when there is tenderness of the abdomen, and be followed by the application of hot poultices, which should be frequently renewed. Calomel in ℈j. doses will always allay irritation of the stomach, and should therefore be given, and be followed up by oily purgatives. In full, plethoric subjects, general bleeding will always be attended with benefit; but in those who have been long in India, I have found leeches answer better, because they diminish action without destroying power; and any quantity of blood may be taken by them.

So long as pain continues, leeches may be applied, and followed by poultices as soon as the bites have ceased to bleed; and till the dejections become natural and healthy, the calomel in ℈j. doses should be given every night, and oily or saline purgatives every morning. If a general soreness continue after the pain is removed, a large blister over the whole belly will always be useful. Emollient and anodyne injections are of the utmost advantage in the treatment of dysentery, and should never be omitted. They may be given frequently in the course of the day; but they should never be so bulky as to cause the muscular coats of the bowel to re-act upon them and expel them immediately.

In the treatment of dysentery, as well as of all other acute diseases in India, the first twelve or twenty hours are of the first consequence, in order to make an impression upon the constitution, and to bring the disease under control, before serious structural derangement has supervened: when these objects are accomplished, the future treatment may be regulated according to circumstances.

Local pains may be removed by the occasional application of leeches. Tenesmus, which depends upon inflammation or irritation of the rectum, will be alleviated by small anodyne enemas, not exceeding ℥jss. or ℥ij., which will generally remain in the bowel: but calomel, as a purgative, with oily and sometimes saline laxatives, must be prescribed till the secretions assume a healthy appearance, when tonic laxatives may be given, and continued till the cure is completed.

The *Erythematic* form of dysentery is much more obscure, and consequently more dangerous: the symptoms are, a dull, deep-seated pain in the bowels, sufficient to distress a patient, but not so severe as to excite alarm; there is no external pain at all; the pulse is not materially altered, neither is there any increased febrile action; the tongue is excited, and the alvine discharges are exceedingly morbid and acrid. This disease is chiefly confined to the mucous membrane of the

colon, and consists of a less acute form of inflammation of this membrane. It is not infrequently complicated with disease of the liver in the older residenters in the climate; and whilst the acute form of dysentery is most frequently met with in those who have recently arrived or who have not long resided in India, this form of the disease is most common to the former class of Europeans. If not treated successfully, it runs at once into ulceration throughout the whole intestine.

Full doses of calomel, with such other purgatives as act upon the mucous glands, are required in this form of the disease, and should be continued without intermission, till healthy action is produced. Leeches, and blisters over the abdomen, are always attended with benefit; and the purgatives I have found to answer best, especially when following the exhibition of calomel, are castor oil, and the subjoined bitter aperient mixture* quickened occasionally by two or three drachms of sulphate of magnesia. During the treatment of dysentery, whether acute or chronic, the greatest attention should be paid to the diet and clothing of the patient. A flannel roller should be kept around the abdomen and loins, and the diet ought to consist of farinaceous substances. The object

* Infus. Gentian. ℥xij.
—— Sennæ ℥vj.
Tinct. Cardam. ℥ij.

of the present Reports is to direct attention to the diseases of India, and not to treat these subjects at large, as they have been brought fully before the profession in my work entitled, "Researches into the most prevalent Diseases of India," &c.

Proportion of Sick.—The proportion of sickness and deaths amongst the European troops in this division is infinitely less than at the Presidency, but greater than in any other, Nagpore and Hyderabad excepted; while the proportion of sickness and deaths amongst Natives is less than in any division of the army except Travancore, and that of cures greater.

Number of Troops composing each Division and Station.—During the period of this statement, there were at Vellore, one European regiment, and two or three battalions of Native infantry; at Arcot, which is a cavalry station, a regiment of European dragoons, and one or two regiments of Native cavalry; at Wallajahbad, two or three battalions of Native infantry; and at Poonamallee, which is the depôt for his Majesty's regiments, between four and five hundred Europeans, who had been discharged from the regiments, to be sent as invalids or pensioners to England, or they were recruits arrived from England.

TABLE V.—Abstract of Diseases of the NORTHERN DIVISION of the Army, for a Period of Six Years, from 1815 to 1820, inclusive.

Europeans Admitted into Hospital.	Natives Admitted into Hospital.	Total Admitted in six Years.	Europeans Cured.	Natives Cured.	Total Cured in six Years.	Europeans Transferred.	Natives Transferred.	Total Transferred in six Years.	Europeans Dead.	Natives Dead.	Total Dead in six Years.	Remaining.
5210	36904	42114	4762	33561	38323	20	1212	1232	353	1735	2088	471

The European Force never exceeded 1449
The Natives never exceeded......... .. 10472

Europeans cured..................... 91 per cent.
Natives cured....................... 90 per cent.

DISEASES.	Nominal Admissions.			Remains of the Nominal Admissions.			Actual Admissions.			Per centage of Diseases upon the Effective Strength.	
	Europeans.	Natives.	Total.	Europeans.	Natives.	Total.	Europeans.	Natives.	Total.	Europeans.	Natives.
Fever	1454	29911	31365	698	13760	14458	756	16151	16907	$13\frac{5}{10}$ per cent.	29 per cent.
Hepatitis.........	570	97	667	274	45	319	296	52	348	$5\frac{3}{10}$	$\frac{1}{10}$ ......
Dysentery	1396	1404	2804	672	648	1320	724	760	1484	$12\frac{9}{10}$	$1\frac{3}{10}$ ......
Diarrhœa.........	132	1204	1336	64	554	618	68	650	718	$1\frac{2}{10}$	$1\frac{1}{10}$ ......
Venereal	2558	6033	8591	1228	2776	4004	1330	3257	4587	$23\frac{8}{10}$	$5\frac{8}{10}$ ......
Cholera	87	889	976	42	409	451	45	480	525	$\frac{8}{10}$	$\frac{8}{10}$ ......
Ulcers	922	3715	4637	443	1709	2152	479	2006	2485	$8\frac{5}{10}$	$3\frac{6}{10}$ ......
Rheumatism .. .	792	5863	6655	381	2697	3078	411	3166	3577	$7\frac{3}{10}$	$5\frac{7}{10}$ ......
Ophthalmia......	108	602	710	52	277	329	56	325	381	1	$\frac{5}{10}$ ......
Other Diseases.	2062	18515	20577	990	8517	9507	1072	9998	11070	$19\frac{2}{10}$	$17\frac{9}{10}$ ......
Grand Total....	10081	68237	78318	4844	31392	36236	5237	36845	42082		

Total Strength of the Force, during these six Years, were Europeans .	5576
Total Strength of the Force, during these six Years, were Natives	55570
The proportion of Sickness amongst the Europeans, per cent	93
The proportion of Sickness amongst the Natives, per cent	66
The proportion of Deaths amongst the Europeans, per cent	6
The proportion of Deaths amongst the Natives, per cent	3

NORTHERN DIVISION.

STATIONS.—The NORTHERN DIVISION takes in a tract of country which extends from Kistnah river south, to Ganjam north on the coast. The principal stations are Masulipatam, Ellore, Samulcottah, Vizianagrum, Vizagapatam, Chicacole, and Berhampore. The minor stations are Guntoor, Beswarah, Noozeed, Condapilly, Rajahpoor, Rajahmundry, Kimmedy, and Aska.

CLIMATE.—From November till March the climate is extremely pleasant. The thermometer ranges from 72° in the morning, to 88 and 90° in the day. The wind, during the latter part of November, the whole of December, January, February, and during the early part of March, is from the north and north-east. From the end of March till May, the wind becomes southerly, accompanied with clouds of dust. In May and June the land-winds, which are strong from the westward, generally commence, and continue, with more or less force, till the commencement of the monsoon in September and October.

PREVAILING DISEASES.—The diseases most prevalent in this division are *fever* and *dysentery*, which are most frequently met with between the

months of August and November. December, January, February, and March, are generally very healthy; but in April and May, during the period of the southerly winds, which are attended by immense clouds of dust, slight ephemeral fevers are common; but they are of little moment, being easily removed by a few purgatives, or by an emetic. June and July are generally healthy, but sometimes, from exposure to the sun and hot winds, *coup de soleil* occurs.

With the exception of Masulipatam and Ellore, most of the other stations in this division are situated in the vicinity of mountains and thick jungle; and sometimes near marshy ground, where fever occasionally prevails to a great extent, and where it is extremely formidable.

Symptoms and Treatment of these Diseases.—The type of fever is bilious remittent, and very similar to what is found at Seringapatam and Wynad, in the western hills which divide Mysore from Malabar. It sometimes takes the quotidian and double tertian form, with some of the marked symptoms of typhus, or adynamic fever, such as stupor, black dry tongue, and great debility, but without its characteristic contagion. The name which this fever generally goes by in India is *jungle* or *hill-fever*. When it is not completely eradicated, it always terminates in intermittents, which come on at particular periods of the moon. It has been known

to continue for years to afflict those who became its subjects, whether they remained in India, or returned to Europe. It also frequently occasions functional and organic diseases of the liver and large bowels, especially when it has been neglected or inactively treated at its commencement.

This fever belongs exclusively to that part of the division where there are most hills and jungles. At Masulipatam and Ellore, both situate in an open country and sandy soil, the fever is by no means so formidable, though of similar character, and it is easily removed by purgatives. During my residence at Masulipatam, from 1808 to 1810, there was not a single casualty, or death from disease depending upon the climate, amongst the European residents, and not more than five amongst the details of European troops, namely, the artillery company, which consisted of about one hundred men. In the European regiment, from hard drinking and exposure, the deaths were greater of course than in the residents; but even amongst them there were few fatal cases. This is confirmed by the present statement, which will shew the deaths to be only six per cent amongst Europeans, in six years.

The *treatment* of this fever in its worst form is similar to the treatment which I have recommended in the Reports of the Mysore Division for the fever occurring at Seringapatam; but

what I wish to enforce—and I cannot impress the necessity of it too strongly—is the prompt employment of active means of cure in the early stage of the disease. A copious depletion at the commencement, aided by emetics and purgatives, according to circumstances, may save much subsequent trouble, and preserve many lives; while a timid, temporising treatment will lay the foundation for a broken constitution, and a protracted sickness. As the object of these statements, however, is not to enter at large into the detail of treatment, I shall confine myself merely to the indications of cure in such fevers, leaving the medical practitioner to exercise his own judgment regarding the choice and extent of his remedies, and their application to particular cases and circumstances. One thing, however, I must observe: if the disease be not checked in a few hours, the patient is either lost, or that state of disease supervenes, which renders him, for ever afterwards, a plague to himself, and a burden to the service.

In the worst forms of these fevers, a general blood-letting, or the application of a number of leeches near the organ which betrays the most disorder, or both measures, is requisite early in the stage of excitement. If this stage be allowed to proceed, even for a few hours, without such means being adopted in order to moderate it, the energy of the vascular system soon

becomes exhausted; and depletions, excepting locally, can seldom be ventured upon. The steady and active administration of purgatives suited to the circumstances of particular cases, is still requisite; and when the energies of the system are obviously sinking, they should be combined or alternated with tonics, stimulants, and antispasmodics—such as bark, the sulphate of quinine, camphor, ammonia, &c.

In those cases where the powers of life are greatly oppressed, and excitement is either insufficiently developed, or altogether absent, purgatives, with bark, ammonia, and camphor, are obviously requisite. If, accompanying this state of system, any particular organ evinces congestion, the application of a few leeches, followed by blisters, and the exhibition of a full dose of calomel at night, and an active purgative draught in the morning, will generally prove beneficial.

When the disease assumes a regularly remittent or intermittent type, the exhibition of bark or sulphate of quinine, during the remissions, will be serviceable, provided that calomel and purgatives have been administered so as to remove morbid accumulations from the bowels, and congestion of the hepatic organs. But even after these ends have been attained, it will be necessary to give a dose of calomel at bed-time, and a purgative in the morning, in order to ensure the good effects of the bark upon the system. If

bark be exhibited whilst congestion of the liver exists, or morbid accumulations remain in the *prima via*, it will either not be easily retained in the stomach, or if retained, it will increase the visceral disease, and lead on to organic change in the liver and spleen.

When the fever passes into a chronic remittent form, with accessions at full or change of the moon, obstructions in some of the abdominal viscera should be dreaded, particularly of the liver. In these cases, calomel, or mercurial alteratives, and saline deobstruents, are requisite, and should be alternated with brisk cathartics; and the bark, or sulphate of quinine, given in full doses shortly before the expected accession of fever.

Proportion of Sick.—The proportion of sickness in this division amongst Europeans, is less than in any division of the army. The cures are equal to those in the Presidency, Hyderabad, Nagpore, and Ceded Districts. The deaths are proportionately less than in these divisions, but greater than in any other. The proportion of sickness amongst the natives is greater than in the Carnatic and Travancore, but less than in all other divisions. Cures fewer, except in the field force; and deaths equal to those in Hyderabad and Nagpore.

Number of Troops composing each Division and Station.—At Masulipatam there were generally a European regiment of infantry, a com-

pany of artillery, and two or three native battalions: at the other principal stations, one or two battalions of native infantry; and at the minor stations, two, three, or five companies of native detachments, from the principal stations.

Table VI.—Abstract of Diseases of the Travancore Subsidiary Force *of the Army, for a Period of Six Years, from 1815 to 1820, inclusive.*

Europeans Admitted into Hospital.	Natives Admitted into Hospital.	Total Admitted in six Years.	Europeans Cured.	Natives Cured.	Total Cured in six Years.	Europeans Transferred.	Natives Transferred.	Total Transferred in six Years.	Europeans Dead.	Natives Dead.	Total Dead in six Years.	Remaining.
6651	5973	12624	6415	5585	12000	17	139	156	164	228	392	76

The European Force never exceeded 1130
The Natives never exceeded 2566

Europeans Cured .... 96 per cent.
Natives ditto .... 93 per cent.

DISEASES.	Nominal Admissions.			Remains of the Nominal Admissions.			Actual Admissions.			Per Centage of Diseases upon the Effective Strength.	
	Europeans.	Natives.	Total.	Europeans.	Natives.	Total.	Europeans.	Natives.	Total.	Europeans.	Natives.
Fever	598	1527	2125	252	688	940	346	839	1185	$5\frac{5}{10}$ per cent.	$6\frac{4}{10}$ per cent.
Hepatitis	2385	53	2438	1002	24	1026	1383	29	1412	$22\frac{1}{10}$	$\frac{2}{10}$ ......
Dysentery......	1811	169	1980	761	77	838	1050	92	1142	$16\frac{8}{10}$	$\frac{7}{10}$ ......
Diarrhœa	180	94	274	76	43	119	104	51	155	$1\frac{6}{10}$	$\frac{3}{10}$ ......
Venereal	2231	1359	3590	938	612	1550	1293	747	2040	$20\frac{7}{10}$	$5\frac{7}{10}$ ......
Cholera	220	209	429	93	95	188	127	114	241	2	$\frac{8}{10}$ ......
Ulcers	448	2540	2988	189	1143	1332	259	1397	1656	$4\frac{1}{10}$	$10\frac{6}{10}$ ......
Ophthalmia ...	531	1195	1726	224	538	762	307	657	964	$4\frac{9}{10}$	5 ......
Rheumatism...	437	115	552	184	62	246	253	53	306	4	$\frac{4}{10}$ ......
Other Diseases	2651	3482	6133	1114	1567	2681	1537	1915	3452	$24\frac{6}{10}$	$14\frac{6}{10}$ ......
Grand Total...	11492	10743	22235	48 33	4849	9682	6659	5894	12555		

Total Strength of the Force, during these six Years, were Europeans	6241
Total Strength of the Force, during these six Years, were Natives ...	13102
The proportion of Sickness amongst the Europeans, per cent	106
The proportion of Sickness amongst the Natives, per cent	45
The proportion of Deaths amongst the Europeans, per cent	2
The proportion of Deaths amongst the Natives, per cent	1

TRAVANCORE DIVISION.

STATION.—This division includes Quilon, Anjengo, Cochin, and Alleppee, on the Malabar coast.

CLIMATE.—The soil of this district is sandy, the weather very hot, and liable to heavy falls of rain between June and December. After a shower of rain the sun generally comes out, and produces a disagreeable *moist heat*; but, under cover, the climate is cool and very agreeable.

PREVAILING DISEASES, SYMPTOMS, AND TREATMENT.—The prevailing diseases of this climate are clearly those of the *liver* and *dysentery*, in the European constitution; while *ulcers* and *fever* appear to be the diseases to which natives are most liable.

Fever, in this country, is nearly equally prevalent, both in the European and native constitution; its character is similar to that which prevails in the Carnatic, and the plan of cure is of course the same in both, (see the Report of the Presidency Division); but hepatic diseases and dysentery are those which require more particularly to be looked after. The latter frequently depends upon the former: this dependence ought

to be recollected, when we enter upon the treatment of dysentery.

The *symptoms* of *liver disease* are sometimes very insidious, and not easily detected, particularly when the parenchymatous texture of the viscus is the part affected. The strictest attention, therefore, as well as professional tact, is perhaps more required in ascertaining the existence of this malady, especially when seated in the substance of the organ, and in its subsequent management, than in any other disease in India: and although it is a difficult task to point out clearly what close observation and pathological research can best disclose, yet there are some symptoms that may be depended upon, and those I shall endeavour to state briefly.

Acute pain is present only when the coverings of the liver are the seat of disease. This symptom is generally attended with febrile heat, full, quick, or sharp pulse, and white, excited tongue; which are often the only signs that indicate inflammation of the internal structure of the organ. Accompanying these symptoms, there are generally a sense of fulness and oppression at the epigastrium and right hypochondrium, extending under the sternum, and backwards beneath the scapulæ; a feeling of anxiety and lowness of spirits, cough, interrupted breathing, and irregular state of the bowels, with a morbid condition of the biliary secretion, and much restlessness during the night.

Whilst these symptoms, together with the occasional presence of pain about the right shoulder, indicate disease of the substance of the liver, pain, tenderness upon pressure, hard, quick pulse, shew the presence of inflammatory action in the surface of the organ. But whilst its substance is often the seat of disease, without materially affecting the surface, this latter, on the other hand, is seldom inflamed without the internal structure being more or less involved in disorder, both in respect of its functions and of its vascular action.

To remove these derangements, general and local bleeding, with smart purgatives, should be resorted to without loss of time, and repeated until they are completely subdued; after which an alterative course of mercury, for a fortnight or three weeks, and the nitro-muriatic solution externally, will effect a cure. This acute form of hepatitis usually affects healthy, robust men, on their first arrival in India, and frequently terminates rapidly in abscess, if not checked at its commencement: the practice, therefore, should be energetic, in order to subdue inflammatory action at the onset of the disease.

The chronic form of diseased liver generally occurs amongst old, debilitated Europeans, and amongst those who have suffered from the first or inflammatory stage, and who, having been discharged from medical treatment, had returned

to their duty before this organ had recovered a healthy action. This practice of premature dismission from treatment is, I am sorry to say, too common throughout India. It is in the highest degree injurious to the constitution, and it cannot fail to load the pension and invalid establishments. The chronic form of liver disease is that in which mercurial action is required; and this action is always most beneficially produced when mercurial remedies are exhibited as alteratives and laxatives.

To affect the mouth has frequently been considered the great desideratum; but as there are many subjects in which ptyalism cannot be produced, to follow up a course of medicine for months, in order to attain an object that may be quite impossible, cannot fail of proving highly injurious to the constitution. Hence the danger and mischief of an indiscriminate use of mercury in the diseases of India.

It has been asserted, and I believe it is generally considered, that when the mouth is once affected, the patient is safe. I shall not here argue the converse of this position, but I can assert, that I have seen men die under the influence of mercury, and in a high state of salivation. I am aware that this is contending against the bulk of opinion in India, and I feel the responsibility I bring upon myself in making the assertion; but I do it with a view to correct what appears

to me to be a very erroneous inference in practice—an inference which has done, I imagine, nearly as much mischief as the disease which the practice is intended to remedy.

I do not intend to say that mercury is not a most valuable medicine, and, indeed, one from which more is to be expected than from any other, perhaps, in the materia medica; but it may be, and it certainly is, upon many occasions, carried far beyond the bounds of judicious administration.

When the mouth becomes affected, it is very satisfactory, because it shews that the absorbents and the glandular system are not in a state of torpor; but to continue the use of it for months, or even till ptyalism is produced, I must contend, is most injurious to the constitution. I look to its effects upon the alvine secretions, and when I see them changed, and find healthy discharges produced, I consider that the use of mercury is beneficial. When I find my patient's strength and spirits recover during the administration of it, I feel quite satisfied, whether the mouth be affected or not.

There is another state of diseased liver, which is more common and more obscure than either of those I have already noticed, and this is a congestive state, in which the *portal* system partakes very largely of the derangement, and which is accompanied by a loaded state of the gall-bladder

and by accumulations of bile and obstruction in its ducts.

The symptoms of this state are, oppression weight at the præcordia and pit of the stomach, without pain, but with a sense of fulness and distension about the chest, as if there was not room to breathe, or as if there was a heavy weight in the neighbourhood of the stomach. This condition of the hepatic organs is of much more importance than has usually been attached to it. When neglected, or improperly treated, it frequently runs on to inflammation of the internal structure of the organ, and abscess. This is a form of diseased liver that would require more to be said upon it than the limits of this Report will admit, and therefore I mention it merely to direct particular attention to it, with a view to its further investigation. The reader who is desirous of entering more fully on the subject, will find it discussed more at large in my "Researches into the Diseases of India," &c.

Alterative mercurials, with aloetic purgatives, are, in this particular form of disease, of great importance: these, with local bleeding by leeches, warm poulticing over the whole epigastric region, and frequent friction with stimulating liniments, or the use of the nitro-muriatic solution internally and externally, is the practice I have adopted with advantage. At a future period, I shall enter more fully into this subject, and shall advance

such facts connected with its pathology as I have been able to collect. At present, I confine myself to the limits which I have prescribed for these Reports.

As dysentery may probably depend upon disease of the liver, and as we find in India that it actually does so depend in many cases, the removal of the latter disorder will frequently prevent the former. I shall not here enter upon the consideration of the general treatment of dysentery, farther than to say, that the bowels ought to be kept in a lax state, and that leeches may be used with advantage to remove pain in the abdomen. Tenesmus, in general, depends upon irritation in the lower part of the rectum. When it occurs, small anodyne injections may be given with the best effects, or leeches may be applied along the sacrum.

Proportion of Sick, &c.—The proportion of European sick in this division is less than in any other division of the army, with the exception of the Northern Division and Field Force. The cures are greater, and deaths fewer, than in any other division. There is likewise less sickness amongst the native troops. The cures among them are equal to those of any other division, and the deaths fewer.

The force is composed of one European regiment, two companies of artillery, and three battalions of native infantry.

Table VII.—Abstract of Diseases of the Mysore Division *of the Army for a Period of Six Years, from* 1815 *to* 1820, *inclusive.*

Europeans Admitted into Hospital.	Natives Admitted into Hospital.	Total Admitted in six Years.	Europeans Cured.	Natives Cured.	Total Cured in six Years.	Europeans Transferred.	Natives Transferred.	Total Transferred in six Years.	Europeans Dead.	Natives Dead.	Total Dead in six Years.	Remaining.
17228	42004	59232	16225	38526	54751	313	753	1066	536	1692	2228	1187

The European Force never exceeded 3088
The Natives never exceeded........... 10533

Europeans cured .... 94 per cent.
Natives ditto..................... 91 per cent.

DISEASES.	Nominal Admissions.			Remains of the Nominal Admissions.			Actual Admissions.			Per Centage of Diseases upon the Effective Strength.	
	Europeans.	Natives.	Total.	Europeans.	Natives.	Total.	Europeans.	Natives.	Total.	Europeans.	Natives.
Fever...............	6438	31889	38327	2833	12118	14951	3605	19771	23376	$26\frac{8}{10}$ per cent.	$46\frac{9}{10}$ per cent.
Hepatitis	4359	207	4566	1918	79	1997	2441	128	2569	$18\frac{1}{10}$	$\frac{2}{10}$ ......
Dysentery	5374	1721	7095	2365	654	3019	3009	1067	4076	$22\frac{4}{10}$	$2\frac{3}{10}$ ......
Diarrhœa	129	1353	1482	57	515	572	72	838	910	$\frac{5}{10}$	$1\frac{8}{10}$ ......
Venereal	3858	4328	8186	1698	1745	3443	2160	2583	4743	16	$5\frac{6}{10}$ ......
Cholera	346	1833	2179	153	697	850	193	1136	1329	$1\frac{4}{10}$	$2\frac{4}{10}$ .....
Ulcers	1767	4831	6598	778	836	1614	989	3995	4984	$7\frac{3}{10}$	$8\frac{7}{10}$ ......
Rheumatism ...	1194	4367	5561	526	1660	2186	668	2707	3375	$4\frac{9}{10}$	$5\frac{8}{10}$ ......
Ophthalmia......	904	794	1698	398	302	700	506	492	998	$3\frac{7}{10}$	1 ......
Other Diseases	6192	16568	22760	2725	6296	9021	3467	10272	13739	$25\frac{8}{10}$	$22\frac{3}{10}$ ......
Grand Total ...	30561	67891	98452	13451	24902	38353	17110	42989	60099		

Total Strength of the Force, during these six Years, were Europeans 13428
Total Strength of the Force, during these six Years, were Natives. ... 45998
The proportion of Sickness amongst the Europeans, per cent 128
The proportion of Sickness amongst the Natives, per cent 91
The proportion of Deaths amongst the Europeans, per cent 4
The proportion of Deaths amongst the Natives, per cent.......... 3

MYSORE DIVISION.

Stations.—The Mysore Division includes Bangalore, Seringapatam, Chittledroog, Nundydroog, Ryacottah, and Mysore.—Malabar and Kanara, which include Cannanore, Tellicherry, Mangalore, and Manantoddy in Wynad, are also included in this division.

Climate.—Bangalore, Ryacottah, and Nundydroog, are generally considered healthy stations; but Seringapatam, Serah, and Chittledroog, have always been experienced to be the reverse, particularly to Europeans. For several years, however, no Europeans have been stationed either at Seringapatam or Chittledroog; and, consequently, that excessive degree of sickness which usually prevailed when they were made European stations, is not apparent.

The great Mysore Valley is bounded by the Western Ghauts and Table Land of Mysore, and extends between the 76° and 77° of east longitude, till it is terminated by the mountains near the source of the Cauvery.

Seringapatam, Serah, and Chittledroog, are situated in this valley, and are exposed to the influence of both the N.E. and S.W. monsoons.

Rainy weather, therefore, prevails from the beginning of May till the month of December.

The latter part of December, the whole of January, February, March, and April, are dry and sultry; yet, in the mornings and evenings, a cold, bleak N.E. wind prevails between December and January; and the hottest season is from the latter period to the commencement of the S.W. monsoon, in May. Heavy dews and a damp atmosphere prevail more or less throughout the year, but more particularly in the months of January, February, March, and April; and the difference of temperature between the night and day is extreme. This is the most sickly period of the year.

Prevailing Diseases.—To the generally moist state of the climate, and to the sudden transitions from heat to cold, may be attributed the prevailing diseases in this division; which vicissitudes, according to concurring circumstances, produce fever, dysentery, or liver diseases. Fever and dysentery, however, exist in the largest proportion; and although fever is eight, and dysentery four per cent more than liver complaints, yet I am disposed to believe that a deranged state of the functions of the liver is to be found in almost every case of this fever: but in whatever degree the liver may be affected in the first instance, there cannot be a question that it becomes seriously disordered in the progress of the disease,

for, alterations of this viscus, and indeed of other viscera, are invariably found on examination after death.

The types of the prevailing fever are simple, bilious, and inflammatory remittent and intermittents, of a quotidian or double tertian form. When either of those varieties of fever is improperly treated, and yet does not terminate fatally, it generally leaves a periodical quartan or tertian, which remains for years upon the subjects once affected by it, and whose accessions are generally influenced by the changes of the moon.

Cannanore, and the stations on the Malabar coast, are extremely healthy; but at Manantoddy, in Wynad, situate in jungles and hills, fever prevails to a great degree, and is of the same nature with that which I have described as endemic at Seringapatam.

The following information, received from the late Lieutenant-Colonel Lambton, is applicable alike to Mysore, Wynad, and the Malabar coast, and is not out of place here. He says, "After the conclusion of the western monsoon, the weather on the Malabar coast is delightful and serene, and the atmosphere perfectly clear, till about the middle of January, when the weather becomes hot. Exhalations from the ravines are the consequence, and they increase so fast, that about the middle of February the whole of the low country is covered with a thick vapour, which,

from being checked in its ascent by the cold regions at the summit of those mountains, continues to collect till the south-west winds set in. This immense reservoir of vapour is then condensed, and passes over the Mysore country, in those heavy rains which mark the western monsoon.

"Previous, however, to the setting in of the rains, the evaporation above the Ghauts is very considerable, and the whole of that valley in which Seringapatam is situated is covered with a vapour, almost as heavy as that which hangs over Kanara and Malabar. This is generally in the months of February and March, and in the beginning of April, till the thunder-showers clear it away."

Symptoms and Treatment of Prevailing Diseases.—In the treatment of this fever,—which partakes, at the commencement, of strong inflammatory action, with hard full pulse, white excited tongue, &c., with local determinations to the liver, alimentary canal, and brain,—bleeding, either local or general, or perhaps both, according to circumstances, is of the greatest importance in checking the activity of the disease. This remedy, with the addition of purgatives, may be said to comprise the chief part of the treatment; but the efficacy of both depends upon the boldness with which they are resorted to in the first stage of the disease. For if the vascular excitement be not

soon moderated, great exhaustion quickly supervenes, accompanied by signs of congestion in the liver, and a low or adynamic state of the system generally.

Bark has been much used, and, I have heard, with the best effects; but from what I have seen of this fever, I would earnestly recommend, that the inflammatory and congestive symptoms be removed, and the alvine secretions restored to a healthy state, before the bark be had recourse to. When the fever takes the regular intermittent form, it is wonderful how completely bark checks the paroxysm; yet even in this case purgatives are requisite between the expected monthly return of the paroxysms, but it is necessary to continue the bark more than a few days, before and after these accessions, and to give it in full doses.

When a fever of this kind comes under my care, I always ascertain the time of its accession, which is generally governed by particular periods of the moon; I prescribe the purging practice till a day before the expected paroxysm, then I throw in the bark, and continue it either till the accession of fever, or for two or three days after the period of its expected appearance has passed over; when purgatives are again commenced with, and continued till the accession of the paroxysms is again expected.

With this practice, I have seldom known these accessions of fever return more than two or three

times; but a course of alteratives and laxatives ought to be always continued for three or four months afterwards, until the functions of the liver and the alvine secretions are restored to a healthy condition, when I consider the cure effected.

When treating, myself, the remittent form of this fever in its early stage, I have scarcely ever seen it run into the intermittent form; and, as the above practice has always proved beneficial in such cases as have come under my care, after they became intermittent, I am led to believe that more attention is too generally paid by some practitioners, to check the accession of fever by means of bark, than to remove congestive symptoms, or to restore healthy action and secretions to the liver and intestinal canal:—in other words, the more prominent symptoms are treated, and the states of the internal viscera, upon which the disease depends, are neglected.

I consider that when bark is exhibited in this fever before the inflammatory derangements, which frequently exist in the large abdominal viscera, are subdued, and before the disordered secretions are removed by appropriate treatment, that the disease will frequently terminate in chronic obstructions of these viscera, and the other disorders contingent on such states.

After local congestions and morbid secretions are removed by general or local depletions and purgatives, the bark, or the sulphate of quinine,

will be most beneficial. Yet even then its effects upon the pulse, the tongue, and the skin, should be narrowly watched; and if it renders the tongue dry and excited, and the skin hot and dry, it should be immediately laid aside, and local depletions, aperients, diaphoretics, &c. employed in its stead, according to circumstances. In all cases the bark should be combined or alternated with cooling purgatives or aperients, or with diaphoretics, especially upon commencing the exhibition of it under circumstances rendering the benefit derivable from it at all doubtful. On such occasions, the decoction of this substance should be first resorted to, either combined with camphor or the liquor ammoniæ acetatis, or holding some aperient and cooling salt in solution. Upon convalescence from these forms of fever, the bitter aperient mixture already recommended, consisting of the compound infusions of gentian and senna, with a little sulphate of magnesia, will generally prove beneficial. After attacks of these fevers, great attention to diet and change of air are particularly requisite.

Proportion of Sick.—The proportion of European sick in this division is less than in any other division of the army, with the exception of Travancore, the Field Force, and Northern Division. The cures are greater than those of any, except Travancore and the Southern Division, and the deaths are fewer, except those of Travan-

core, and they are equal to those of the Field Force and Southern Division.

The proportion of sickness amongst natives is greater than that of any other division of the army, except Nagpore: the cures equal to those of Hyderabad, and fewer than those of the Carnatic: deaths are the same as in Hyderabad, Northern Division, and the Field Force; but greater than in the Carnatic, Ceded Districts, and Nagpore.

Troops of this Division.—Bangalore, the principal station, has generally a European regiment of dragoons, a European regiment of infantry, a company of artillery, and four or five battalions of natives. Nundydroog, Ryacottah, Chittledroog, and Seringapatam, have only one battalion of natives at each station. Cannanore has one European regiment, and two native battalions. Mangalore, one native battalion; and at all the other minor stations there are two or three companies of natives: making in all, one European regiment of dragoons, two European regiments of infantry, one company of artillery, and twelve battalions of native infantry.

TABLE VIII. — *Abstract of Diseases of the* CEDED DISTRICTS, *for a Period of Six Years, from* 1815 *to* 1820, *inclusive.*

Europeans Admitted into Hospital.	Natives Admitted into Hospital.	Total Admitted in six Years.	Europeans Cured.	Natives Cured.	Total Cured in six Years.	Europeans Transferred.	Natives Transferred.	Total Transferred in six Years.	Europeans Dead.	Natives Dead.	Total Dead in six Years.	Remaining.
9085	16886	25971	8272	15973	24245	334	438	772	313	449	762	192

The European Force never exceeded 1526
The Natives never exceeded 5380

Europeans cured .... 91 per cent.
Natives cured .... 94 per cent.

DISEASES.	Nominal Admissions.			Remains of the Nominal Admissions.			Actual Admissions.			Per Centage of Diseases upon the Effective Strength.	
	Europeans.	Natives.	Total.	Europeans.	Natives.	Total.	Europeans.	Natives.	Total.	Europeans.	Natives.
Fever	2794	9110	11904	1258	4191	5449	1536	4919	6455	24 per cent.	$20\frac{2}{10}$ per cent.
Hepatitis	2486	58	2544	1119	27	1146	1367	31	1398	$21\frac{4}{10}$	$\frac{1}{10}$ ......
Dysentery	3526	847	4373	1587	390	1977	1939	457	2396	$30\frac{4}{10}$	$1\frac{8}{10}$ ......
Diarrhœa	32	356	388	15	164	179	17	192	209	$\frac{2}{10}$	$\frac{7}{10}$ ......
Venereal	2783	4229	7012	1033	1946	2979	1750	2283	4038	$27\frac{4}{10}$	$9\frac{4}{10}$ ......
Cholera	220	571	791	99	263	362	121	308	429	$1\frac{8}{10}$	$1\frac{2}{10}$ ......
Ulcers	773	2803	3576	348	1290	1638	425	1513	1938	$6\frac{6}{10}$	$6\frac{2}{10}$ .... .
Rheumatism...	484	4152	4636	218	2010	2228	266	2142	2408	$4\frac{1}{10}$	$8\frac{8}{10}$ ......
Ophthalmia ...	521	424	945	235	196	431	286	228	514	$4\frac{4}{10}$	$\frac{8}{10}$ ......
Other Diseases	2711	8747	11458	1220	4024	5244	1491	4723	6214	$23\frac{3}{10}$	$19\frac{4}{10}$ ......
Grand Total...	16330	31297	47267	7132	14501	21633	9198	16796	25994		

Total Strength of the Force, during these six Years, were Europeans . 6375
Total Strength of the Force, during these six Years, were Natives ... 24257
The proportion of Sickness amongst the Europeans, per cent 142
The proportion of Sickness amongst the Natives, per cent 69
The proportion of Deaths amongst the Europeans, per cent 5
The proportion of Deaths amongst the Natives, per cent 2

CEDED DISTRICTS.

STATIONS.—This division includes Bellary, Gooty, Kurnool, on the Tomboodra and Cuddapah.

CLIMATE.—The vicissitudes of the atmosphere in this division are very great and sudden, as in Mysore. In January the thermometer ranges from 60° to 98°, and there are heavy fogs and winds varying all round the compass. In February the thermometer is from 60° to 98°, and the weather more sultry and oppressive: the winds are south-east and south-west. In March the thermometer is from 68° to 105° and 106°: strong south-west winds prevail, with close, sultry, and very oppressive weather, and sudden transitions from heat to cold, and sultry nights. During April, the thermometer is from 78° to 110°; and the weather cloudy and oppressive, with strong winds from the south-west, some showers, and clouds of dust. This weather continues till November, when the thermometer falls, and ranges from 66° to 88°, with heavy dews at night, and frequent showers. The interval from March to December is the most sickly period; and 1816, 1817, and 1818, were the most sickly years.

PREVAILING DISEASES.—*Fever* and *dysen-*

tery, as in other divisions, are the principal diseases amongst the European troops; but hepatitis bears a greater proportion to these diseases in this division than in any other, with the exception of the Presidency, Mysore, and Travancore: and I am disposed to consider this disease as the endemic of the climate. At Kurnool, where I was stationed with a European regiment for eight months, the liver was found diseased in almost every case of death that happened during that period, from whatever disease this fatal termination occurred. I am induced, therefore, to consider European constitutions as particularly liable to diseased liver in this climate, while fever may be considered the endemic in regard to the native constitution.

Venereal sores and common ulcers underwent an extraordinary change in this climate; they became purple, with ragged edges, bled profusely, and resisted every application. The protracted convalescence, likewise, observed at this station, was extremely singular; the debility that remained, after the disease was apparently removed, was striking, and could not be satisfactorily accounted for, either by the nature of the malady, or the remedies required for its cure. It could be referred only to the unhealthy state of the climate, arising from the exhalations from the soil and from decayed vegetable matter floating in the atmosphere.

Symptoms and Treatment of Diseases.—The diseases that prevail amongst Europeans in this division of the army, require as active a treatment as those in any other division—bleeding, local and general, aided by purging, being the chief remedies. I was much struck at the rapidity with which disease ran its course in this division, and that the liver should be found diseased in almost every fatal instance. Various circumstances, however, appeared to me to be the cause of this; and amongst them I must not omit to mention the unrestrained use of narcotic drugs and intoxicating liquors amongst the soldiery—not such as Europeans usually drink, but such as are more destructive to life than the climate is, with all its vicissitudes, and unwholesome exhalations derived from the soil, and from the decayed matters covering it.

The liquors to which I allude are made with fermented toddy, mixed with opium and stramonium, to which chunam or lime is occasionally added to promote fermentation. This is a very common and destructive beverage, used by European soldiers at all times, and in every part of the Madras territories; and as, I believe, it partakes of the character of spirits, it is subject to a tax, which produces a considerable revenue to the government.*

* I am well aware, however, that the government do all in their power to prevent European soldiers procuring these liquors,

In camps there is another kind of liquor, which is notorious from its pernicious effects: this is *booza,* commonly called *bogee.* It is made from a grain called ragee, mixed with water, and fermented. When new, it is a very agreeable acid drink; the natives use it in common, and I believe it is innocent: but as it is prepared for European soldiers, I have reason to know that it is a most intoxicating and destructive liquor.

The ingredients usually added, are opium, bhang, stramonium, and a kind of cake made in squares, like chocolate, called *majum cakes.* These are composed of bhang, stramonium, nux vomica, jaggery (a species of sugar), and milk. A small quantity of this in a cup of bogee will produce an effect, not exactly of intoxication, but a peculiar madness and pleasurable sensation (as the soldiers have often told me), that renders them careless of every thing but pleasure.

and that their orders on this subject are most strict: but although Europeans cannot themselves purchase a drop of it, the cook-boys, who are natives, can always procure it; and therefore the soldier can command it at any time, in defiance of all orders. So long, therefore, as this spirit is made, so long the soldier will drink it, whatever orders are given; and it becomes a question, whether the population of the country should be deprived of liquors to which they have been long habituated, on account of advantages to the European force, who only indulge in it to excess, and who form so very small a proportion of the population.

If they were to stop here, it is probable no great injury would arise; but they drink to excess, and the consequence is, that in the course, perhaps, of one night, a man lays himself up with a fatal dysentery, and a day or two terminates his existence. This, and indeed all those drinks, are sold at a very small price: three or four fanams, or, in English money, one shilling, would purchase enough to make eight or ten men drunk, and, consequently, to occasion the loss frequently of half the number.

These pernicious liquors are to be found in all camps, and almost at every station in the army; but at this station (Kurnool), where there was a very extensive bazar belonging to the camp, and another attached to the town and fort, I had an opportunity of making myself acquainted with the whole matter: and although I had no power to check or control the sale of these articles, I was at least prepared for the treatment of the diseases produced by them; and, as congestive states of the venous system, and active inflammations, were the consequences, local and general bleeding, with the exhibition of active purgatives, were indispensably requisite; but I lament to say that my means of practice were at this time very limited, from the following circumstances:—

First, the difficulty of procuring leeches. As there were none to be got in the neighbourhood of the Tomboodra river, I was under the necessity

of sending for them from Gooty, Cuddapah, and Cummum; for I must be allowed to remark, that the lancet will not always answer the purpose of leeches: and although I had men constantly posting to bring supplies, I found it impossible to procure them in the quantities required.

Second, deficiency of medicine. There had, for some time, been a deficiency of medicine with the army; and, on the present occasion, the medical stores of this division were completely empty, and neither calomel, jalap, nor the purging salts, were to be procured.

I had no purgative but oil, which, although a valuable medicine, is not suited to all the acute diseases of India, in their various stages. I mention this deficiency, with a view merely of directing attention to the matter; because the most active treatment is required in the diseases of the climate, which run rapidly through their course, and, if not checked at the commencement, they terminate, in a very short time, either in ulceration in the bowels, or abscess in the liver.

I regret to say, that I lost more men while the regiment was in this division, than I had ever done before at any other station.

Proportion of Sick.—The proportion of *European* sick in this division is greater than in that of Mysore, Northern Division, and Travancore, but less than in all others. The number of cures is equal to the Presidency, Northern, Nag-

pore, and Hyderabad Divisions; and the deaths fewer than in those divisions.

Sickness amongst the *natives* exceeds that amongst the Northern, Southern, Centre, and Travancore Divisions, but is less than in all others; the cures fewer than in the Centre and Southern Division, but greater than in all others; and deaths equal to what they are in those divisions, including the Presidency and Nagpore.

It is singular how much more Europeans are disposed, by original constitution, to liver disease and dysentery than the natives;*—liver disease in the former being $21\frac{4}{10}$, and in the latter only $\frac{1}{10}$ per cent; and dysentery in the European being $30\frac{4}{10}$, and in the natives only $1\frac{8}{10}$ per cent. Ulcers appear to be the only disease the Europeans and natives are nearly equally liable to in this division.

Number of Troops, &c.—At Bellary there was generally a European regiment of infantry, a company of artillery, and three battalions of natives. At Kurnool, during 1816 and 1817, there were a European regiment, a company of artillery, and two battalions of native infantry; one battalion of native infantry at Gooty, and another at Cuddapah.

* Some share of the immunity from these diseases enjoyed by the natives, may be imputed to the modes of living which they pursue.

TABLE IX.—*Abstract of Diseases of the* FIELD FORCE *of the Army, for a Period of Six Years, from* 1815 *to* 1820, *inclusive.*

Europeans Admitted into Hospital.	Natives Admitted into Hospital.	Total Admitted in six Years.	Europeans Cured.	Natives Cured.	Total Cured in six Years.	Europeans Transferred.	Natives Transferred.	Total Transferred in six Years.	Europeans Dead.	Natives Dead.	Total Dead in six Years.	Remaining.
8825	25848	34673	7798	22647	30445	376	1332	1708	369	1050	1419	1101

The European Force never exceeded... 2428
The Natives never exceeded 8412

Europeans cured .... 88 per cent.
Natives cured .... 87 per cent.

DISEASES.	Nominal Admissions.			Remains of the Nominal Admissions.			Actual Admissions.			Per Centage of Diseases upon the Effective Strength.	
	Euro-peans.	Natives.	Total.	Euro-peans.	Natives.	Total.	Euro-peans.	Natives.	Total.	Europeans.	Natives.
Fever	2526	18849	21375	910	7729	8639	1616	11120	12736	$18\frac{5}{10}$ per cent.	$32\frac{7}{10}$ per cent.
Hepatitis.........	909	91	1000	328	38	336	581	53	634	$6\frac{6}{10}$	$\frac{1}{10}$ ......
Dysentery	3389	2107	5496	1221	864	2085	2168	1243	3411	$24\frac{9}{10}$	$3\frac{6}{10}$ ......
Diarrhœa	79	751	830	29	408	437	50	343	393	$\frac{5}{10}$	1 ......
Venereal.........	2644	4037	6681	952	1656	2608	1692	2381	4073	$19\frac{4}{10}$	7 ......
Cholera	571	1428	1999	206	586	792	365	842	1207	$4\frac{1}{10}$	$2\frac{4}{10}$ ......
Ulcers	653	2826	3479	236	1159	1395	417	1667	2084	$4\frac{7}{10}$	$4\frac{9}{10}$ ......
Rheumatism....	613	2458	3071	221	1008	1229	392	1450	1842	$4\frac{5}{10}$	$4\frac{2}{10}$ ......
Ophthalmia	173	422	595	63	174	237	110	248	358	$1\frac{2}{10}$	$\frac{7}{10}$ ......
Other Diseases	2241	10635	12876	807	4361	5168	1434	6274	7708	$16\frac{4}{10}$	$18\frac{4}{10}$ ......
Grand Total	13798	43604	57402	4973	17983	22956	8825	25621	34446		

Total Strength of the Force, during these six Years, were Europeans .	8704
Total Strength of the Force, during these six Years, were Natives....	33933
The proportion of sickness amongst the Europeans, per cent...........	101
The proportion of sickness amongst the Natives, per cent	76
The proportion of Deaths amongst the Europeans, per cent....	4
The proportion of Deaths amongst the Natives, per cent	3

FIELD FORCES.

The Field Force was composed of all troops employed on field service from 1815 to 1820, namely,—the army of reserve on the Tomboodra in 1815; the force under Colonel Marriott, at Kurnool, in 1815 to 1816; Brigadier-General Pritzler and Colonel Thomas Munro's force in the Dooab, in 1817; and the first and third division of the army of the Deccan, in 1817 and 1818; the field force under General Pritzler in the Dooab, in 1818, 1819, and 1820, as well as various corps and detachments not included in any division return made during this period of six years.

The Dooab and southern Mahratta country is, in all respects, like the Ceded Districts, and the troops which served there from 1815 to 1820 were liable to the diseases peculiar to that climate. The treatment is the same. (See Ceded Districts.)

That part of the *field force* called the first and third division of the army of the Deccan, under the immediate command of his Excellency Lieut.-General Sir Thomas Hislop, Bart. and G.C.B., and with which army I had the honour to serve

as superintending surgeon, was assembled at Hurdah, near the Nurbuddah, in October 1817. The troops, whilst marching to this point, during the months of August, September, and October, suffered dreadfully from the excessive heavy monsoon, which set in that year; and fevers, chiefly of the remittent and intermittent types, were very general. In November, however, the weather became fine, and the troops healthy. By the end of November the army were formed for active service, and crossed the Nurbuddah river on the 1st of December. They proceeded without interruption towards the Vindiah mountains, where they arrived on the 6th, and ascended the high table-land of Malwah, on the 7th of December, at Onchode.

The space of country between the river and these mountains has a rich soil, but which is much neglected, from the circumstance of its belonging to that predatory class of men called Pindaries. This district is covered with low and loose jungle; and there is very little of it cultivated, except near the villages, which are all extremely neat and clean. It is evident that it is capable of great improvement, the soil being very rich, and remarkably well watered.

The troops became particularly healthy on ascending the high table-land of Malwah, where the climate was delightfully pleasant, and they continued so during the period they served in that

country. From December till February, the mornings and nights were excessively cold, the temperature was sometimes as low as 30 degrees of Fahrenheit's thermometer, and ice in our wash-basin was by no means infrequent. During the day, the thermometer seldom rose above 80°; but I am told it is as hot here as in any other part of India during the land-wind season, of which, however, I cannot judge from personal observation, having left that country in February; but if I were to form an opinion from the general appearance of the inhabitants, and the comfort of their villages, I should certainly consider them not only a healthy but a happy race. They are strong and robust, clean in their persons, and extremely well clothed. The face of the country is open, rather flat, and highly cultivated with wheat and poppies, which give it a beautiful appearance.

Prevailing Diseases.— During seven months, from September to March, these divisions traversed a very extensive space of country; in the early part of this march they proceeded through unwholesome climates, and were exposed to heavy rains and great vicissitudes of weather, the thermometer ranging from 30° to 40° in the morning and evening, and from 94° to 106° in the day. *Fever*, of the bilious remittent form, was most general both in Europeans and natives. This disease prevailed most during

October and November; but, by attention and decision in treating it, we never had, at any time, a heavy sick-list; for, although the number of sick were considerable, they were very soon cured, and returned to their duty with very little loss by death.

The *symptoms* of this fever were highly inflammatory, with excessive pain in, and determination to, the head, and disturbance of the functions and circulation of the liver, which, if neglected, soon terminated fatally.

The *treatment* most successful in Europeans, was a copious bleeding at the commencement, which at once arrested and removed the most distressing symptom, headach. This, followed up by full doses of calomel, of from ten to twenty grains, and by the subsequent exhibition of active cathartics, effected a cure in a few days, without the aid of bark. I have, on various occasions, stated, that the success of treatment depends entirely upon the activity and boldness with which the disease is met in the early stage; and this point is of so much importance, that it cannot be insisted upon too much, or repeated too often.

The treatment amongst the native troops was more simple, but its salutary effects depended *entirely* upon its *timely* application. Six grains of tartar emetic, dissolved in a quart of water, of which a wine-glassful given every ten or fifteen

minutes, till full vomiting was produced, at once relieved headach and thirst. The same dose, repeated every three hours during the following day, acted smartly upon the bowels, and kept a constant moisture on the skin. On the third day the patient was generally free from fever, and recovered rapidly from that time; but in some cases, where the tongue continued foul, three grains of emetic tartar were dissolved in a quart of water, of which a wine-glassful was given every four or five hours. This seldom failed in two or three days to remove the fever, without further aid. I have noticed this treatment, when speaking of the fever in the Carnatic; and the success which I have invariably seen to follow it, induced me to recommend its general adoption throughout those divisions of the army which were under my superintendence.

Some medical officers, however, preferred the usual and general mode of treatment, *i. e.* small doses of calomel and antimonial powder often repeated; but, from the observations I have been able to make, I found that they had always a heavy sick-list, and had more men unfit for duty than those who treated them with the tartar emetic solution. One point, however, I cannot lay too much stress upon, which is, that not only the utility of this remedy, but the successful treatment of fever generally in India, depends entirely upon its early employment; because

if fever be neglected at the commencement, congestions and obstructions soon supervene in the abdominal viscera, and the most obstinate remittents and intermittents follow, which, if their lives be preserved, disqualify the sufferers for the active duties of life in India.

Proportion of Sick.—The proportion of sickness is less in this force than in any of the divisions, except the Northern Division. The cures are fewer, and deaths equal to those in Mysore and Southern Division, but fewer than in any other, except Travancore.

The sickness amongst natives is greater than in any other divisions, except Hyderabad, Nagpore, and Mysore; cures fewer, and deaths equal to those in Hyderabad, Mysore, and Northern Division; but it must be remembered, that many of the deaths in this force were occasioned by wounds.

TABLE X.—Abstract of Diseases of the HYDERABAD SUBSIDIARY FORCE, for a Period of Six Years, from 1815 to 1820, inclusive.

Europeans Admitted into Hospital.	Natives Admitted into Hospital.	Total Admitted in six Years.	Europeans Cured.	Natives Cured.	Total Cured in six Years.	Europeans Transferred.	Natives Transferred.	Total Transferred in six Years.	Europeans Dead.	Natives Dead.	Total Dead in six Years.	Remaining.
19743	55425	75168	18054	50831	68885	497	2433	2930	1013	1714	2727	626

The European Force never exceeded 2644
The Natives never exceeded.......... .. 11641

Europeans cured..................... 91 per cent.
Natives cured......................... 91 per cent.

DISEASES.	Nominal Admissions.			Remains of the Nominal Admissions.			Actual Admissions.			Per centage of Diseases upon the Effective Strength.	
	Euro-peans.	Natives.	Total.	Euro-peans.	Natives.	Total.	Euro-peans.	Natives.	Total.	Europeans.	Natives.
Fever	7358	34439	41797	2922	14706	17628	4436	19733	24169	$33\frac{9}{10}$ per cent.	$30\frac{4}{10}$ per cent.
Hepatitis.........	2296	253	2549	912	109	1021	1384	144	1528	$10\frac{5}{10}$	$\frac{2}{10}$ ......
Dysentery	7964	6717	14681	3162	2869	6031	4802	3848	8650	$36\frac{7}{10}$	$5\frac{9}{10}$ ......
Diarrhœa.........	90	397	487	36	170	206	54	227	281	$\frac{4}{10}$	$\frac{3}{10}$ ......
Venereal	5548	9932	15480	2203	4241	6444	3345	5691	9036	$25\frac{5}{10}$	$8\frac{7}{10}$ ......
Cholera	386	2336	2722	154	1098	1252	232	1238	1470	$1\frac{7}{10}$	$1\frac{9}{10}$ ......
Ulcers	1283	7007	8290	510	2992	3502	773	4015	4788	$5\frac{9}{10}$	$6\frac{2}{10}$ ......
Rheumatism	1648	10207	11855	655	4359	5014	993	5848	6841	$7\frac{5}{10}$	9 ......
Ophthalmia......	809	1776	2585	322	759	1081	487	1017	1504	$3\frac{7}{10}$	$1\frac{5}{10}$ ......
Other Diseases.	5364	23596	28960	2130	10076	12206	3234	13520	16754	$24\frac{7}{10}$	$20\frac{8}{10}$ ......
Grand Total....	32746	96660	129406	13006	41379	34385	19740	55281	75021		

Total Strength of the Force, during these six Years, were Europeans .	13079
Total Strength of the Force, during these six Years, were Natives	64761
The proportion of Sickness amongst the Europeans, per cent	150
The proportion of Sickness amongst the Natives, per cent	85
The proportion of Deaths amongst the Europeans, per cent	8
The proportion of Deaths amongst the Natives, per cent	3

HYDERABAD SUBSIDIARY FORCE.

Stations.—This division of the army includes the cantonment of Secunderabad and Jaulnah.

Climate.—The south-west monsoon commences generally at Hyderabad about the beginning of June, and continues, at intervals, till about the middle of October. During November and December the sky is frequently cloudy, the winds easterly, and sometimes, when the north-east monsoon is heavy, a considerable quantity of rain falls. From the beginning of January to the end of May the sky is generally clear, and the weather dry. Dews are not infrequent in January and the early part of February; and in some years, slight showers of rain fall during these months. The annual fall of rain is, I believe, estimated at thirty-two inches; but some years it does not amount to half that quantity. The mean temperature in the house during one year, as deduced from observations made at sun-rise, two o'clock in the afternoon, and sun-set, has been, in January $74\frac{1}{2}$, February $76\frac{1}{4}$, March 84, April $91\frac{1}{3}$, May 93, June 88, July 81, August $80\frac{1}{3}$, September 79, October 80, November $76\frac{1}{2}$, December $74\frac{1}{6}$, giving as an annual mean $81\frac{1}{2}$. Had the observa-

tions been made earlier in the morning, and later in the evening, and the thermometer placed in a more exposed situation, it is probable that the *annual mean* would have been at least two or three degrees lower. Indeed, the *daily range*, which more especially affects health, is very considerable during November, December, January, and February, amounting, in the shade, generally to about 20, and not infrequently to 30.

In 1817, the months of April, May, June, and July, were very close, sultry, and hot, with some thunder-storms, and frequent showers, the thermometer ranging from 72 to 88, 98, 102, and 103; towards the end of July, the weather became damp, with drizzling rain, the thermometer ranging from 76 to 80, and the weather occasionally very hot. This unsettled state of the atmosphere continued till the end of August, when the monsoon set in, and continued till October and November. A great deal of rain fell during this period, and at its close the weather became delightful till March and April, when the hot season commenced.

The most sickly period is generally during the wet and cold seasons, and the proportion of European deaths, which is greater in this division than in any other, with the single exception of Madras, chiefly occurs at this period.

Prevailing Diseases.—The climate of Jaulnah is colder than that of Hyderabad, and

liable to greater variations of temperature; the prevailing diseases, too, are the same at both stations; but I have reason to think, that fevers are more frequent at Jaulnah than at Hyderabad. Remittent fever and dysentery are particularly prevalent at both these stations, especially about the end of the monsoon, during the cold weather, and are to be ascribed to the exhalations from the moist and previously inundated soil, and to the great and sudden variations of temperature.

This form of fever was particularly noticed amongst the European horse artillery-men, and considered to arise from their being lodged in a close, crowded, and uncomfortable barrack; but when the fever became prevalent the men were removed to tents. This removal was always followed by an immediate decline of the disease. It was also remarked, that in some years the fever was attended with great determination to the head; in other years, to the chest; in others, to the liver; and in some cases, to the head and chest alternately.

Fever and dysentery are the most prevalent and destructive diseases throughout the whole of this force; but as it is a well-known fact, that few cases of diseased liver have ever recovered, if allowed to remain either at Secunderabad or Jaulnah, and as, from my own observation, I have found that, in most cases of examination after deaths from fever and dysentery, the liver was

either in a high state of congestion or of suppuration, I am disposed to believe that disease of this organ generally accompanies both these disorders, and is far more prevalent than the returns would seem to indicate; and I should almost be inclined to consider it as the endemic of the country in regard to the European constitution, while fever exclusively is the endemic of the natives.

Symptoms and Treatment.—This fever comes on with excessive pain in the head, flushed face, suffused eyes, full, quick pulse, and loaded tongue. The treatment is similar to that which is recommended in the diseases of Mysore: but as the liver is (as I have already observed) in every instance more or less diseased in this country, I would recommend particular attention to that organ. It is a singular circumstance, that this fever, like that of Mysore, frequently terminates in the most obstinate intermittents, attended with considerable enlargement and hardness of the belly, which have been called physconia. But, from what I have myself seen, I am disposed to think that all these cases of hard and swelled abdomen are the effects of visceral obstruction, arising from previous disease, frequent relapses, or imperfectly cured cases of fever, dysentery, or inflamed liver or spleen—a view of the subject deserving the particular attention of the medical practitioner.*

* I have been led to suppose that these obstructions are the

Men in this state of enlarged abdomen seldom or never complain of pain, but they are disabled from performing the active duties of soldiers, and are consequently either invalided, pensioned, or discharged from the service. But as I consider this a matter of real importance to the service, both as it regards the efficiency of the army, and the public expenditure, I shall bring it under consideration in my remarks on the general return for 1821.

During the treatment of the cases of fever met with in the districts under this division, the strictest attention should be paid to the functions and state of the liver. If fulness, tenderness, and oppression, be felt in the region of this organ, with a disordered state of the biliary secretion, and any of the symptoms already noticed as indicating inflammation of the liver, leeches should be applied, and repeated according to the effect produced, and the use of purgatives steadily persisted in. When the disease has been neglected, or when patients are affected with enlargements of the liver and spleen, owing to repeated attacks or relapses of fever, local depletions, repeated according to circumstances, and followed by blisters, hot poultices, and the application of the nitro-muriatic solution over the

result of the inappropriate use of bark, thrown in with the intention of checking fever, without a due attention to the removal of the visceral derangements accompanying it.

abdomen, are particularly serviceable. At the same time the exhibition of full doses of calomel at bed-time, and of an active purgative in the morning, will prove of the utmost advantage in removing the congested and obstructed state of the viscera, causing the abdominal distension and hardness. When the spleen is enlarged, the purgatives should either be given along with tonics or alternated with them, and the nitro-muriatic solution ought at the same time to be employed twice daily over the region of this viscus. After purgatives have been steadily exhibited for some time, alteratives and deobstruent aperients may be prescribed, and the purgatives given only every third or fourth day. When the obstruction is removed, and debility only remains, the strength will be restored by gentle tonics combined with aperients, and attention to the diet. Change of air will also be beneficial.

The *proportion of European sickness* in this force is less than in the Carnatic and Nagpore, but greater than in any of the other divisions: *cures* the same as at the Presidency, Northern Division, Ceded Districts, and Nagpore; and *deaths* greater than in any other division, except the Presidency.

The *Native sickness* is greater than in any division, except Nagpore; the *cures* equal to those of Europeans, and equal to those at Mysore; and *deaths* the same as in Mysore, Northern Division, and Field Force.

At Secunderabad there were, generally, during the period of this statement—an European regiment, a regiment of native cavalry, four or five battalions of native infantry, and a company of artillery. At Jaulnah an European regiment, one troop of horse artillery, two companies of artillery, two or three regiments of native cavalry, and four or five battalions of native infantry.

During the years 1817, 1818, and 1819, the bulk of the Hyderabad force was called the second division of the army of the Deccan, and of course actively employed on field service in that space of country situated between the Godavery and Tapty rivers.

TABLE XI.—*Abstract of Diseases of the* NAGPORE SUBSIDIARY FORCE *during a Period of Forty-eight Months, in the Years* 1816, 1817, 1818, 1819, *and* 1820.

Europeans Admitted into Hospital.	Natives Admitted into Hospital.	Total Admitted in six Years.	Europeans Cured.	Natives Cured.	Total Cured in six Years.	Europeans Transferred.	Natives Transferred.	Total Transferred in six Years.	Europeans Dead.	Natives Dead.	Total Dead in six Years.	Remaining.
3586	27400	30986	3289	24670	27959	61	1141	1202	155	591	746	1079

The European Force never exceeded 684
The Natives never exceeded 7355

Europeans cured .... 91 per cent.
Natives ditto .... 90 per cent.

DISEASES.	Nominal Admissions.			Remains of the Nominal Admissions.			Actual Admissions.			Per Centage of Diseases upon the Effective Strength.	
	Europeans.	Natives.	Total.	Europeans.	Natives.	Total.	Europeans.	Natives.	Total.	Europeans.	Natives.
Fever	2618	25259	27877	917	10337	11254	1701	14922	16623	$82\frac{3}{10}$ per cent.	$51\frac{8}{10}$ per cent.
Hepatitis	205	41	246	72	17	89	133	24	157	$6\frac{4}{10}$	$\frac{1}{10}$ ......
Dysentery......	795	1385	2180	279	568	847	516	817	1333	$24\frac{9}{10}$	$2\frac{8}{10}$ ......
Diarrhœa	96	1032	1128	34	424	458	62	608	670	3	$2\frac{1}{10}$ ......
Venereal	496	3030	3526	214	1243	1457	282	1787	2069	$13\frac{6}{10}$	$6\frac{2}{10}$ ......
Cholera	61	639	700	22	272	294	39	367	406	$1\frac{8}{10}$	$1\frac{2}{10}$ ......
Ulcers	93	3700	3790	33	1517	1550	60	2183	2243	$2\frac{9}{10}$	$7\frac{5}{10}$ ......
Rheumatism...	157	2427	2584	45	996	1041	112	1431	1542	$5\frac{4}{10}$	$4\frac{9}{10}$ ......
Ophthalmia ...	39	402	441	14	165	179	25	237	262	$1\frac{2}{10}$	$\frac{8}{10}$ ......
Other Diseases	825	8231	9056	289	3375	3664	536	4856	5392	$25\frac{9}{10}$	$16\frac{8}{10}$ ......
Grand Total...	5385	46146	51531	1919	18914	20833	3466	27232	30698		

Total Strength of the Force, during these six Years, were Europeans	2065
Total Strength of the Force, during these six Years, were Natives ...	28772
The proportion of Sickness amongst the Europeans, per cent	173
The proportion of Sickness amongst the Natives, per cent	95
The proportion of Deaths amongst the Europeans, per cent	7
The proportion of Deaths amongst the Natives, per cent	2

NAGPORE SUBSIDIARY FORCE.

Topography and Climate.—The town of Nagpore lies on a flat plain, with occasional rising hills and black cotton soil, open on all sides, except the west, where there is a low range of tabular trap-hills. It was on the summit of these hills, during the years 1816-17, that Colonel Scott's brigade was cantoned when they suffered so severely from fever. The nearest formidable jungle to Nagpore is the Shawpore Forest, and that is about one hundred miles distant; but the desert country near Nagpore is covered by a stinted, scattered brush-wood.

From June to the end of October is rainy; from November till March is cold and dry; and from April till June is the hot season. The nights and mornings are generally cold throughout the year, and the variation of temperature is very great. From November to February the thermometer ranges between 50 and 90, and sometimes considerably above 100.

The general character of the whole country, from the river Godavery to the Nurbuddah, is alike; and there is a gradual ascent from the coast to the high lands of Malwah. The soil is

black and stony, covered by scattered jungle, and in some parts by excessively high grass, which I have myself found by measurement to be twelve and fifteen feet high. These jungles and high grass, covering a very extensive space, through which troops are obliged to march, are generally in the morning covered with dew, and the evaporation from them makes the cold excessive; it is always in the morning that the troops march—that period of the day when the causes of fever are generally most concentrated, and the system most susceptible of their influence: and I have no doubt that much disease is produced in these countries from this cause: the necessity of attention to this fact, and, therefore, of warm clothing for the troops, particularly the natives, is manifest.

Prevailing Diseases.—Amongst the European troops, *fever* and *dysentery* are the most general and destructive diseases; but I consider fever as the endemic of the climate, both in regard to Europeans and natives. I am of opinion that dysentery, in this district of country, depends more upon irregularity of living and drinking, than upon climate; and the same observation holds good in regard to liver complaints.

Character of the Endemic.—The fever at this station differs materially in its character at different periods of the year, and requires very different treatment. In the cold season, after the

rains, although there is great pain in the head, as well as other inflammatory symptoms, it would appear that bleeding is not attended with the same advantages as it is under similar circumstances in all other parts of the country, or, indeed, in the same country during the hot season.

In the rainy season, and for some time afterwards, the fever is characterised by complete and regular paroxysms, consisting of well-defined cold, hot, and sweating stages, with perfect intermissions. As the air becomes drier and colder, the paroxysms become less complete, till there is neither cold nor sweating stages, and the fever is almost entirely reduced to the appearance of a simple febrile excitement of the vascular system, which comes on gradually at the usual hour, and advances slowly to its maximum, rarely very high, and then declines.

TREATMENT.—The success of treatment in this fever during the rainy season, and for some time afterwards, appears to depend entirely upon bark being given in considerable quantity. I shall use the words of a highly respectable medical officer, Dr. John Wyllie, who served with the brigade at Nagpore the whole time they were there, from 1816 to 1821.

He says, "Bark is the grand remedy, not throughout the cold season, but throughout the rainy season, and for some time afterwards; with-

out it there are no means of curing the fever, from July and August till the end of October.

"After the rains have ceased for some time, or towards the beginning of November, when the air has become dry and cold, and with the progress of the dry weather, I have invariably found the bark become less and less beneficial, and have experienced it to be more and more necessary to purge and give calomel. By the end of January, or even before that time, I have found that the bark was of scarcely any use; and that the cure was only to be effected by repeated purgatives, and the administration of calomel and antimonial powder; and that the same remedies were efficient throughout the hot season, but that they again lost their power soon after the commencement of the rains."

In further confirmation of this view of the subject, the following extract of a letter from a medical officer in charge of a regiment, dated Nagpore, November 1818, may not be uninteresting: —

"The light company, only sixty-three strong, were detached amongst the hills for a few days in search of Appah Saib,* sixty-one of whom have returned with fever, and, generally speaking, very severe: eleven men died. The fever being accompanied with great determination of blood to, and severe pain in, the head, I followed

* The Nagpore rajah.

the bleeding system, assisted by purging and blistering; but was much disappointed at finding all my efforts of no use, the paroxysm returning as violently as ever, and the patient losing ground daily. In this dilemma I consulted a medical officer who had been some time at Nagpore, and in charge of Europeans, who recommended the cinchona. Never having used this in the fevers we have had in Malwa, and having a kind of prejudice against it, I tried it with but little hopes: I soon, however, changed my opinion, and now feel more indebted to it than to any medicine in the materia medica. I am persuaded, if I had not adopted this practice, I should have lost sixty or seventy men during the last month (October). I never saw any thing so decided in its effects. In the first place I give an emetic, then throw in the bark in doses of two or three drachms every hour, or oftener if necessary, which generally prevents a return of the paroxysm; but if it does return, it is comparatively slight, the bark is continued, and there is no return of fever; but the headach continues, the tongue is foul and loaded, the dejections black or green; and now for calomel and purgatives, which complete the cure. In the hot season the fever requires a very different treatment, and bleeding and purgatives are the chief means of cure."

There is certainly something singular and very unusual, both in the fever and the treatment.

I have given a longer extract from this letter than I otherwise would have done, because I have a full conviction that the author of the letter has detailed faithfully the facts as they were observed, and I notice them with a view to promote further inquiry.

It is probable that circumstances connected with the climate might have induced a greater debility at the particular season to which the foregoing account especially relates, than during the hot weather; and that tonics, such as bark, given in the large and frequent doses mentioned, may have become necessary to obviate that state of debility which prevented the beneficial action of the usual remedies. This supposition is partly confirmed by the fact, that after the administration of bark, calomel and other purgatives were found to possess their usual efficacy.

From the reports, however, which I have seen of this fever, it would appear, that in the first stage there is an almost total absence of derangement of the functions of the abdominal viscera; but as the fever changes with the weather, these functions become more disturbed, and the characteristics of existing derangement in the abdominal viscera more visible, viz. costiveness, tympanitic state of the intestines, furred tongue—sometimes a smooth, glossy tongue, of a purplish red colour; scanty, high-coloured urine; a dirty, yellowish colour of the eye; a dry, harsh, unperspiring state of the skin, and often a tendency to œdema.

I have never myself treated this fever at Nagpore, though I have treated many cases that have been sent from that country to the general hospital at Madras, in all of which cases I have observed great derangement of the visceral functions; but whether this is a primary or secondary affection, must be determined at some future period. For my own part, I am disposed to think that attention to the state of the stomach, liver, and bowels, and a more decided use of local depletions and purgatives, at the commencement of the malady, might prevent much of the disease and wretchedness that follow it.

The *proportion of European sickness* in this force is greater than in any other division, except the Presidency and Centre Divisions; *cures* the same; and *deaths* equal to those of the Centre Division, but more than those in any other, except the Presidency and Hyderabad.

The *Native Sickness* is greater than in any division of the army; *cures* equal to those of the Northern Division, but fewer than those in any other, except the Field Force; and *deaths* the same as those of the Carnatic and Ceded Districts.

The force at Nagpore and Chanda, in 1818, 1819, and 1820, consisted of a regiment of European infantry, two and a quarter companies of artillery, one troop of horse artillery, six battalions of native infantry, and a regiment of native cavalry.

Table XII.—General Returns of the Sick of the Madras Army, *for the Year* 1821.

No. I.—Admissions into Hospitals, the effective Strength being 9553 Europeans, and 82,046 Natives.—Total, 91,599.

Divisions of the Army.	Cholera.		Fever.		Liver.		Dysentery.		Diarrhœa.		Rheumatism.		Ulcers.		Venereal.		Ophthalmia.		Other Diseases.		Total Admitted.	
	Euro.	Nat.	Euro.	Natives.	Euro.	Nat.	Euro.	Nat.	Euro.	Nat.	Euro.	Natives.	Euro.	Nat.	Euro.	Nat.	Euro.	Nat.	Euro.	Natives.	Euro.	Natives.
Presidency	76	73	637	1042	498	8	747	78	145	172	162	288	142	152	231	272	47	50	881	1527	3566	3662
Centre Division	25	199	44	1555	142	7	128	189	8	153	98	393	32	301	45	273	15	69	134	1459	671	4598
Southern Division	34	203	285	1111	157	11	245	154	99	121	78	395	83	475	237	244	33	98	438	1973	1689	4785
Travancore Subs^y. Force ...	23	41	34	184	214	3	115	29	15	31	68	127	19	475	193	195	17	6	327	431	1025	1522
Northern Division	15	89	36	1289	26	12	17	62	28	90	19	424	12	332	58	357	1	53	107	1095	319	3803
Mysore Division..............	111	99	478	3135	605	23	616	136	22	225	76	490	157	831	464	578	94	125	995	1965	3618	7607
Ceded Districts	4	593	373	1526	65	4	75	154	1	115	17	308	34	252	255	524	60	53	130	1209	1014	4738
Hyderabad Subsidiary Force	14	726	480	2108	245	14	401	195	22	160	131	558	71	485	378	513	99	106	437	1284	2278	6149
Nagpore Subsidiary Force...	43	46	792	3744	65	8	289	122	82	169	77	266	55	466	266	423	18	83	356	1236	2043	6563
Field Force in the Dooab ...	12	142	283	1469	93	2	277	123	3	105	28	265	40	243	364	260	9	35	97	992	1206	3636
Field Force, Kandeesh, and Sholapore............	...	316	......	1002	...	3	...	96	...	30	...	169	..	158	...	110	...	28	...	474	......	2336
	357	2527	3442	18165	2110	95	2910	1338	425	1371	754	3683	645	4170	2491	3749	393	706	3902	13645	17429	49399

* See the observations commencing at page 322, on the following ten Tables.

TABLE XIII.— General Returns of the Sick of the MADRAS ARMY, for 1821.

No. II.—CURES.

DIVISIONS OF THE ARMY.	Cholera.		Fever.		Liver.		Dysentery.		Diarrhœa.		Rheumatism.		Ulcers.		Venereal.		Ophthalmia.		Other Diseases.		Total Cured.	
	Euro.	Nat.	Euro.	Natives.	Euro.	Nat.	Euro.	Nat.	Euro.	Nat.	Euro.	Nat.	Euro.	Nat.	Euro.	Nat.	Euro.	Nat.	Euro.	Natives.	Euro.	Natives.
Presidency	64	44	581	1001	454	4	648	64	108	171	140	254	130	141	202	236	45	51	764	1426	3136	3391
Centre Division	18	154	39	1521	97	6	102	189	8	142	72	341	22	278	19	253	5	62	83	1331	465	4277
Southern Division	27	133	268	1022	143	8	197	134	95	113	65	342	75	403	208	216	31	92	406	1858	1515	4321
Travancore Subsy. Force...	22	31	35	201	206	3	105	29	13	31	62	144	19	398	184	162	17	9	304	417	967	1395
Northern Division	10	94	34	1214	23	9	15	55	24	84	19	336	10	292	54	317	1	53	95	962	285	3416
Mysore Division	106	93	439	2941	502	14	538	110	22	205	64	450	159	778	421	507	90	119	917	1812	3258	7029
Ceded Districts.....	4	352	366	1427	54	3	70	124	1	122	15	238	33	235	233	449	59	51	117	1138	952	4139
Hyderabad Subsidiary Force	13	442	448	1920	191	9	336	145	20	138	109	493	64	438	324	457	91	97	376	1181	1972	5320
Nagpore Subsidiary Force	34	31	741	3525	56	7	244	110	71	165	72	217	49	447	237	359	16	78	322	1145	1842	6084
Field force in the Dooab...	12	85	269	1411	83	1	235	105	3	103	22	242	35	227	333	236	9	33	92	885	1093	3328
Field Force, Kandeesh, and Sholapore............	......	163	......	872	......	1	......	75	...	30	......	139	......	147	......	96	...	28	... ..	428	......	1979
	310	1621	3200	17055	2009	65	2490	1140	365	1304	640	3116	596	3784	2215	3288	364	673	3476	12583	15485	44679

Table XIV. — General Returns of the Sick of the Madras Army, for 1821.

No. III. — Deaths.

Divisions of the Army.	Cholera.		Fever.		Liver.		Dysentery.		Diarrhœa.		Rheumatism.		Ulcers.		Venereal.		Ophthalmia.		Other Diseases.		Total Dead.	
	Euro.	Nat.	Euro.	Nat.	Euro.	Nat.	Euro.	Nat.	Euro.	Nat.	Euro.	Nat.	Euro.	Nat.	Euro.	Nat.	Euro.	Nat.	Euro.	Nat.	Euro.	Nat.
Presidency	7	27	11	26	29	3	49	11	9	6	4	8	2	...	2	3	...	...	27	31	140	115
Centre Division	6	64	4	25	5	2	11	8	...	5	...	5	1	1	2	2	...	1	11	32	40	145
Southern Division	8	71	9	29	3	1	39	16	1	8	1	2	...	1	...	1	...	1	15	13	76	143
Travancore Subsidiary Force	...	10	...	3	1	...	9	1	1	...	...	...	...	3	1	1	...	...	6	11	18	29
Northern Division	5	26	3	28	2	1	1	5	1	2	...	8	...	1	...	3	...	1	11	53	23	128
Mysore Division	3	58	9	67	28	5	43	13	1	6	1	9	...	8	1	7	...	...	14	55	100	228
Ceded Districts	...	181	1	39	3	1	3	13	...	3	...	4	...	...	2	6	...	...	5	29	14	276
Hyderabad Subsidiary Force	1	224	6	139	23	4	26	23	...	4	...	2	...	6	1	1	...	...	11	39	68	442
Nagpore Subsidiary Force	9	15	16	71	4	...	31	13	6	6	2	4	...	2	5	6	...	...	12	38	85	155
Field Force in the Dooab	..	57	7	13	5	...	24	13	...	1	...	2	...	1	...	...	..	...	4	40	40	127
Field Force, Kandeesh, and Sholapore	...	97	...	22	...	...	...	3	...	...	...	...	...	...	...	6	...	...	...	13	...	141
	39	830	66	462	103	17	236	119	19	41	8	44	3	23	14	36		3	116	354	604	1929

TABLE XV.—Abstract, shewing the Per Centage of Deaths in the different Divisions of the Army, for the Year 1821.

DIVISIONS OF THE ARMY.	Effective Strength.		Admissions.		Deaths.		Per Centage of Deaths calculated on the Effective Strength.	
	Euro.	Natives.	Euro.	Natives.	Euro.	Natives.	Europeans.	Natives.
Presidency	1457	7571	3566	3662	140	115	10 per cent.	2 per cent.
Centre Division	410	9937	671	4598	40	145	10	2 ......
Southern Division	1007	7951	1689	4785	76	143	7	2 ......
Travancore Subsidiary Force	988	2817	1025	1522	18	29	2	1 ......
Northern Division	431	9279	319	3803	23	128	5	1 ......
Mysore Division	2043	12297	3618	7607	100	228	5	2 ......
Ceded Districts	473	6008	1014	4738	14	276	3	5 ......
Hyderabad Subsidiary Force	1182	9726	2278	6149	68	442	6	5 ......
Nagpore Subsidiary Force	969	7089	2043	6563	85	155	9	2 ......
Field Force in the Dooab	593	6120	1206	3636	40	127	7	2 ......
Field Force, Kandeesh, and Sholapore	......	3251	......	2336	...	141	......	4 ......

Table XVI.—General Returns of the Sick of the Madras Army, for 1821.

No. IV.—Transferred to other Hospitals or Stations.

Divisions of the Army.	Cholera.		Fever.		Liver.		Dysentery.		Diarrhœa.		Rheumatism.		Ulcers.		Venereal.		Ophthalmia.		Other Diseases.		Total Transferred	
	Euro.	Nat.	Euro.	Nat.	Euro.	Nat.	Euro.	Nat.	Euro.	Nat.	Euro.	Nat.	Euro.	Nat.	Euro.	Nat.	Euro.	Nat.	Euro.	Nat.	Euro.	Nat.
Presidency	1	...	2	...	2	...	...	...	1	...	...	...	1	...	1	...	..	...	5	...	13	...
Centre Division	...	...	...	5	20	...	9	...	...	3	22	6	2	2	16	6	7	...	20	11	96	33
Southern Division	...	...	...	...	2	...	...	...	1	...	1	5	...	...	...	...	...	...	1	1	5	6
Travancore Subsidiary Force	...	..	...	1	...	...	...	1	...	...	...	10	...	58	..	25	...	...	1	18	1	113
Northern Division	...	..	...	24	...	1	...	1	...	2	...	32	...	11	...	11	...	..	...	34	...	116
Mysore Division	...	...	...	16	1	...	2	7	...	...	1	13	...	6	...	9	1	3	3	166	8	220
Ceded Districts	...	3	...	11	...	...	...	6	...	1	...	37	...	10	...	12	...	2	1	15	1	97
Hyderabad Subsidiary Force	...	23	6	27	4	...	5	14	...	6	11	42	1	4	6	16	3	2	14	15	50	149
Nagpore Subsidiary Force	...	...	4	...	...	...	2	...	...	...	...	3	...	...	3	1	1	...	1	...	11	4
Field Force in the Dooab	...	...	...	5	...	...	...	2	...	...	...	1	...	1	...	1	...	...	...	11	...	21
Field Force, Kandeesh, and Sholapore	...	35	...	37	..	1	...	10	...	2	...	23	...	5	...	15	...	...	...	8	...	136
	1	61	12	126	29	2	18	41	2	14	35	172	4	97	26	96	12	7	46	279	185	895

TABLE XVII.—General Returns of the Sick of the MADRAS ARMY, for 1821.

No. V.—REMAINING IN HOSPITALS ON THE 31ST DEC. 1821.

DIVISIONS OF THE ARMY.	Cholera.		Fever.		Liver.		Dysentery.		Diarrhœa.		Rheumatism.		Ulcers.		Venereal.		Ophthalmia.		Other Diseases.		Total Remaining.	
	Euro.	Nat.	Euro.	Nat.	Euro.	Nat.	Euro.	Nat.	Euro.	Nat.	Euro.	Nat.	Euro.	Nat.	Euro.	Nat.	Euro.	Nat.	Euro.	Nat.	Euro.	Nat.
Presidency	2	1	34	13	26	1	57	4	24	3	20	26	10	9	23	32	3	...	102	62	301	151
Centre Division	1	...	3	22	21	1	6	5	...	1	6	41	6	30	6	22	3	4	16	96	68	222
Southern Division	1	...	5	36	8	2	9	8	2	1	12	26	8	27	29	21	2	4	23	49	99	174
Travancore Subsidiary Force	...	...	...	...	6	...	2	...	1	...	5	8	...	41	6	12	...	...	13	7	33	68
Northern Division	...	...	1	27	2	1	1	2	1	2	...	36	3	21	3	17	...	...	1	45	12	151
Mysore Division	1	...	28	103	73	...	34	6	..	3	9	25	5	31	46	48	2	...	57	74	255	289
Ceded Districts	...	...	6	50	8	...	2	4	...	3	2	37	1	16	20	75	1	3	7	41	47	229
Hyderabad Subsidiary Force	...	...	17	67	27	1	32	5	...	1	10	40	6	21	39	25	3	5	27	47	161	212
Nagpore Subsidiary Force	...	...	28	126	2	...	9	2	4	3	4	35	6	15	20	34	1	7	22	38	96	260
Field Force in the Dooab	...	...	14	37	5	1	18	5	...	...	6	21	5	14	31	26	...	2	1	64	80	170
Field Force, Kandeesh, and Sholapore	...	1	...	72	...	1	...	5	...	...	...	21	...	8	...	10	...	1	...	30	......	......
	5	2	136	553	178	8	170	46	32	17	74	316	50	233	223	322	15	26	269	553	1152	1926

Table XVIII.—*Abstract of Deaths from Diseases included under the general term of "Other Diseases"* in the General Return.*

Asthma.		Emaciation.		Dropsy.		Inflammation of the Lungs.		Consumption.		Small-Pox.		Paralysis.		Dropsy in the Chest.		Apoplexy.		Inflammatory Tumours.		Inflammation of the Brain.		Inflammation of the Throat.		Abdominal Inflammation.		Inflammation of the Stomach.		Inflammation of the Kidneys.		Inflammation of the Bladder.		Toothach.		Inflammation of the Joints.		Chicken-Pox.		Measles.		Erysipelas.	
E.	N.	E.	N.	E.	N.	E.	N.	E.	N.	E.	N.	E.	N.	E.	N.	E.	N.	E.	N.	E.	N.	E.	N.	E.	N.	E.	N.	E.	N.	E.	N.	E.	N.	E.	N.	E.	N.	E.	N.	E.	N.
3	24	..	32	18	71	8	22	14	26	1	43	4	11	3	10	24	9	1	6	1	2	..	3	..	1	4	3	..	1	..	1	..	1	..	1	..	3	..	2	1	1

Nettle-Rash.		Piles.		Debility.		Inflammation of the Heart.		Inflammation of the Spleen.		Convulsions.		Spitting of Blood.		Heartburn.		Worms.		Drunkenness.		Catarrh.		Indigestion.		Lock-jaw.		Epilepsy.		Palpitation.		Hooping-Cough.		Diabetes.		Hydrophobia.		Mania.		Hydrocele.		Beriberi.	
E.	N.	E.	N.	E.	N.	E.	N.	E.	N.	E.	N.	E.	N.	E.	N.	E.	N.	E.	N.	E.	N.	E.	N.	E.	N.	E.	N.	E.	N.	E.	N.	E.	N.	E.	N.	E.	N.	E.	N.	E.	N.
..	2	1	3	..	3	2	..	1	..	1	..	1	..	1	..	2	..	3	..	..	5	..	9	1	4	1	7	..	1	..	1	..	1	..	2	1	4	1	1	3	4

Scrofula.		Leprosy.		Jaundice.		Suppression of Urine.		Aneurism.		Dislocation.		Wound.		Itch.		Fracture.		Scald.		Contusion.		Drowned.		Accidents.		Total.	
E.	N.	E.	N.	E.	N.	E.	N.	E.	N.	E.	N.	E.	N.	E.	N.	E.	N.	E.	N.	E.	N.	E.	N.	E.	N.	E.	N.
1	4	1	1	1	2	..	2	1	2	..	1	2	6	..	4	..	1	1	7	2	3	1	..	..	3	†111	356

* See General Return of Deaths, Table XIV.

† In this total there is a deficiency of five in the Europeans, and an increase of two in the Natives. The difference, however, is of no moment, as the object of the Return is to shew the Diseases that are classed under the head of "Other Diseases," in the whole of the general Statements which I have made from 1815 to 1821: I have kept this Return separate from the others, because it is that which alone enables me to judge of the Diseases most fatal in India.

Table XIX.—*Per Centage of Deaths of the most Destructive Diseases, for* 1821.

DIVISIONS OF THE ARMY.	FEVER.				LIVER.				DYSENTERY.				CHOLERA.			
	Europeans.		Natives.		Europeans.		Natives.		Europeans.		Natives.		Europeans.		Natives.	
	Rate of Deaths upon the Number of Admissions.	Rate of Deaths upon the Effective Strength of the Division.	Rate of Deaths upon the Number of Admissions.	Rate of Deaths upon the Effective Strength of the Division.	Rate of Deaths upon the Number of Admissions.	Rate of Deaths upon the Effective Strength of the Division.	Rate of Deaths upon the Number of Admissions.	Per Centage of Deaths upon the Effective Strength of the Division.	Per Centage of Deaths upon the Number of Admissions.	Per Centage of Deaths upon the Effective Strength of the Division.	Per Centage of Deaths upon the Number of Admissions.	Per Centage of Deaths upon the Effective Strength of the Division.	Per Centage of Deaths upon the Number of Admissions.	Per Centage of Deaths upon the Effective Strength of the Division.	Per Centage of Deaths upon the Number of Admissions.	Per Centage of Deaths upon the Effective Strength of the Division.
	per cent	per mille	per cent	per mille	per cent	per cent	per cent	per x m.	per cent	per cent	per cent	per mille	per cent	per mille	per cent	per mille
Presidency	1	7	2	3	5	2	37	4*	6	3	14	1	9	4	36	3
Centre Division	9	9	1	2	3	1	28	2	8	2	4	8	24	per cent 1	32	6
Southern Division	3	9	2	4	1	3	9	1	16	3	10	2	23	per mille 8	34	9
Travancore Subsidiary Force	0	0	1	1	4	1	0	0	7	9	3	3	0	0	24	3
Northern Division	8	7	2	3	7	4	8	1	5	2	8	5	33	per cent 1	29	2
Mysore Division	1	4	2	5	4	1	21	4	7	2	9	1	2	per mille 1	58	4
Ceded Districts	per mille 2	2	2	6	5	6	25	1	4	6	8	2	0	0	30	3
Hyderabad Subsidiary Force	per cent 1	5	6	per cent 1	9	2	28	4	6	2	12	2	7	per x m. 8	30	2
Nagpore Subsidiary Force	2	1	2	1	6	4	0	0	11	3	10	2	1	per mille 9	32	2
Field Force in the Dooab	2	1	8	2	5	8	0	0	8	4	10	2	0	0	40	9
Field Force, Kandeesh, and Sholapore	0	0	2	6	0	0	0	0	0	0	3	9	0	0	30	3

	Number of Admissions of the above Diseases.	
	Europeans.	Natives.
Fever	3442	18165
Liver	2110	95
Dysentery	2910	1338
Cholera	357	2527

* Four in ten thousand.

It is singular to observe, that while the number of admissions of liver disease is far greater amongst the Europeans than amongst the natives, the deaths bear a much greater proportion to the admissions in the native troops, than is the case with the Europeans.

TABLE XX.—*Abstract, from the preceding Table, of Per Centage of Deaths of the most Destructive Diseases, for* 1821.

	Total Number of Deaths of the most Destructive Diseases.		Per Centage of Total Deaths of the most Destructive Diseases, calculated upon the Number of Admissions.		Per Centage of Total Deaths of the most Destructive Diseases, calculated upon the Effective Strength.	
	E.	N.	E.	N.	E.	N.
Fever	66	462	19	25	7	6
Liver	103	17	5	18	11	2
Dysentery	236	119	8	9	25	2
Cholera	39	830	11	33	4	10

			Number of Admissions of the above Diseases.		Effective Strength.	
			E.	N.	E.	N.
Fever	......	......	3442	18165	9553	82046
Liver	......	. ....	2110	95		
Dysentery	......	......	2910	1338		
Cholera	......	......	357	2527		

	E.	N.
Total Deaths in the Army during the year 1821, were	604	1929
And the Deaths of Fever, Liver, Dysentery, and Cholera, were	444	1428
	160	501

Leaving 160 Deaths amongst Europeans, and 501 Deaths amongst the Natives, for all other Diseases.

TABLE XXI.—Per Centage of the several Diseases in each Division of the MADRAS *Army, for the Year* 1821.

DISEASES.	Presidency Division.		Centre Division.		Southern Division.		Travancore Subsidiary Force.		Northern Division.		Mysore Division.		Ceded Districts.		Hyderabad Subsidiary Force.		Nagpore Subsidiary Force.		Field Force in the Dooab.		Field Force, Kandeesh, and Sholapore.	
	E.	N.	E.	N.	E.	N.	E.	N.	E.	N.	E.	N.	E.	N.	E.	N.	E.	N.	E.	N.	E.	N.
Fever	$43\frac{8}{10}$	$13\frac{7}{10}$	$10\frac{7}{10}$	$15\frac{6}{10}$	$28\frac{3}{10}$	$13\frac{9}{10}$	$3\frac{4}{10}$	$6\frac{5}{10}$	$8\frac{3}{10}$	$13\frac{8}{10}$	$23\frac{3}{10}$	$25\frac{4}{10}$	$78\frac{8}{10}$	$25\frac{3}{10}$	$40\frac{6}{10}$	$21\frac{6}{10}$	$81\frac{7}{10}$	$52\frac{8}{10}$	$47\frac{7}{10}$	24	...	$30\frac{6}{10}$
Hepatitis	$34\frac{1}{10}$	$\frac{1}{10}$	$34\frac{6}{10}$	0	$15\frac{5}{10}$	$\frac{1}{10}$	$21\frac{6}{10}$	$\frac{1}{10}$	6	$\frac{1}{10}$	$29\frac{6}{10}$	$\frac{1}{10}$	$13\frac{7}{10}$	0	$20\frac{7}{10}$	$\frac{1}{10}$	$6\frac{7}{10}$	$\frac{1}{10}$	$15\frac{6}{10}$	0	...	0
Dysentery	$51\frac{3}{10}$	1	$31\frac{2}{10}$	$1\frac{9}{10}$	$24\frac{3}{10}$	$1\frac{9}{10}$	$11\frac{6}{10}$	1	$3\frac{9}{10}$	$\frac{6}{10}$	$30\frac{1}{10}$	$1\frac{1}{10}$	$15\frac{8}{10}$	$2\frac{5}{10}$	$33\frac{9}{10}$	2	$29\frac{8}{10}$	$1\frac{7}{10}$	$46\frac{7}{10}$	2	...	$2\frac{9}{10}$
Diarrhœa	$9\frac{9}{10}$	$2\frac{2}{10}$	$1\frac{9}{10}$	$1\frac{5}{10}$	$9\frac{8}{10}$	$1\frac{5}{10}$	$1\frac{5}{10}$	$1\frac{1}{10}$	$6\frac{4}{10}$	$\frac{9}{10}$	1	$1\frac{8}{10}$	$\frac{2}{10}$	$1\frac{9}{10}$	$1\frac{6}{10}$	$1\frac{6}{10}$	$8\frac{4}{10}$	$2\frac{3}{10}$	$\frac{5}{10}$	$1\frac{7}{10}$	...	$\frac{9}{10}$
Venereal	$15\frac{8}{10}$	$3\frac{5}{10}$	$10\frac{9}{10}$	$2\frac{7}{10}$	$23\frac{5}{10}$	3	$19\frac{5}{10}$	$6\frac{9}{10}$	$13\frac{4}{10}$	$3\frac{8}{10}$	$22\frac{7}{10}$	$4\frac{7}{10}$	$53\frac{9}{10}$	$8\frac{7}{10}$	$31\frac{9}{10}$	$5\frac{2}{10}$	$27\frac{4}{10}$	$5\frac{9}{10}$	$61\frac{3}{10}$	$4\frac{2}{10}$	...	$3\frac{3}{10}$
Cholera	$5\frac{2}{10}$	1	6	2	$3\frac{3}{10}$	$2\frac{5}{10}$	$2\frac{3}{10}$	$1\frac{4}{10}$	$3\frac{4}{10}$	$\frac{9}{10}$	$5\frac{4}{10}$	$\frac{8}{10}$	$\frac{8}{10}$	$9\frac{8}{10}$	$1\frac{1}{10}$	$7\frac{4}{10}$	$4\frac{4}{10}$	$\frac{6}{10}$	2	$2\frac{3}{10}$	...	$9\frac{7}{10}$
Ulcers	$9\frac{7}{10}$	2	$7\frac{8}{10}$	3	$8\frac{2}{10}$	$5\frac{9}{10}$	$1\frac{9}{10}$	$16\frac{8}{10}$	$2\frac{7}{10}$	$3\frac{5}{10}$	$7\frac{6}{10}$	$6\frac{7}{10}$	$7\frac{1}{10}$	$4\frac{1}{10}$	6	$4\frac{9}{10}$	$5\frac{6}{10}$	$6\frac{5}{10}$	$6\frac{7}{10}$	$3\frac{9}{10}$	...	$4\frac{8}{10}$
Rheumatism	$11\frac{1}{10}$	$3\frac{8}{10}$	$23\frac{9}{10}$	$3\frac{9}{10}$	$7\frac{7}{10}$	$4\frac{9}{10}$	$6\frac{8}{10}$	$4\frac{5}{10}$	$4\frac{4}{10}$	$4\frac{5}{10}$	$3\frac{7}{10}$	$3\frac{9}{10}$	$3\frac{5}{10}$	$5\frac{1}{10}$	11	$5\frac{7}{10}$	$7\frac{9}{10}$	$3\frac{7}{10}$	$4\frac{7}{10}$	$4\frac{3}{10}$	...	$5\frac{1}{10}$
Ophthalmia	$3\frac{2}{10}$	$\frac{6}{10}$	$3\frac{6}{10}$	$\frac{6}{10}$	$3\frac{2}{10}$	$1\frac{2}{10}$	$1\frac{7}{10}$	$\frac{2}{10}$	$\frac{2}{10}$	$\frac{5}{10}$	$4\frac{6}{10}$	1	$12\frac{6}{10}$	$\frac{8}{10}$	$8\frac{3}{10}$	1	$1\frac{8}{10}$	$1\frac{1}{10}$	$1\frac{5}{10}$	$\frac{5}{10}$	...	$\frac{8}{10}$
Other Diseases	$60\frac{4}{10}$	$20\frac{1}{10}$	$32\frac{6}{10}$	$14\frac{6}{10}$	$43\frac{4}{10}$	$24\frac{8}{10}$	33	$15\frac{3}{10}$	$24\frac{8}{10}$	$11\frac{8}{10}$	$48\frac{7}{10}$	$15\frac{9}{10}$	$27\frac{4}{10}$	$20\frac{1}{10}$	$36\frac{9}{10}$	$13\frac{2}{10}$	$36\frac{6}{10}$	$17\frac{4}{10}$	$16\frac{3}{10}$	$16\frac{2}{10}$	...	$14\frac{5}{10}$
Total per Centage of the various Diseases of the Madras Army, for the Year 1821 ...	$244\frac{3}{10}$	48	$163\frac{2}{10}$	$45\frac{8}{10}$	$167\frac{2}{10}$	$59\frac{7}{10}$	$103\frac{3}{10}$	$53\frac{3}{10}$	$73\frac{5}{10}$	$40\frac{4}{10}$	$176\frac{1}{10}$	$61\frac{4}{10}$	$213\frac{8}{10}$	$78\frac{3}{10}$	$192\frac{2}{10}$	$62\frac{1}{10}$	$210\frac{3}{10}$	$92\frac{1}{10}$	203	$59\frac{1}{10}$	...	$72\frac{8}{10}$
Average Diseases in six Years, from 1815 to 1820, in the preceding Statement ...	237	70	188	61	165	61	106	45	93	66	128	91	142	69	150	85	173	95	101	76	...	...

TABLE XXII.—*Abstract shewing the Total Strength of the Army serving under the* PRESIDENCY *of* FORT ST. GEORGE, *both Europeans and Natives; the Total Admission of Diseases, and Rate of Cures, calculated both upon the Effective Strength of the Army, and upon the Actual Admission of Diseases into Hospitals during the Year* 1821.

	Effective Strength of the Army.		Total Admission of Diseases.		Rate of Diseases calculated upon the Actual Strength of the Army.		Total Cures.		Rate of Cures upon the Effective Strength of the Army.		Rate of Cures upon the Actual Admissions of Diseases.	
	E.	N.	E.	N.	E.	N.	E.	N.	E.	N.	E.	N.
Presidency	1457	7571	3566	3662	245 per cent.	48 per cent.	3136	3391	215 per cent.	44 per cent.	88 per cent.	92 per cent.
Centre Division	410	9937	671	4598	164	46	465	4278	113	43	69	93 ......
Southern Division	1007	7951	1689	4785	168	60	1515	4321	150	54	89	90 ......
Travancore Subsidiary Force	988	2817	1025	1522	104	54	967	1395	97	49	94	92 ......
Northern Division	431	9279	319	3803	74	40	285	3416	66	36	89	90 ......
Mysore Division	2043	12297	3618	7607	177	61	3258	7029	159	57	90	92 ......
Ceded Districts	473	6008	1014	4738	214	78	952	4139	201	68	93	87 ......
Hyderabad Subsidiary Force	1182	9726	2278	6149	192	63	1707	5251	144	53	75	85 .... .
Nagpore Subsidiary Force ...	969	7089	2043	6563	210	92	1842	6084	190	85	90	92 ......
Field Force in the Dooab	593	6120	1206	3636	203	59	1093	3328	184	54	90	91 ......
Field Force, Kandeesh, &c.	......	3251	.... .	2336	... .	72	......	1979	... .	60	... .	84 ......
	9553	82046	17429	49399			15220	44611				

REMARKS

ON THE PRECEDING

GENERAL RETURNS FOR 1821.

As the returns of the medical board have been made out with more precision and correctness for the year 1821 than for any former period, I have separated them from the others, and selected them as a foundation for some observations, by which I shall be enabled to shew a defective system of hospital discipline, calculated to produce not only serious loss to the service, but to involve a deep and heavy expense to government.

I have preferred the returns of this year, too, as they present less sickness, the army being in quarters, not exposed to fatiguing marches, and having, in a great degree, overcome the fatigues of the preceding campaign.

It will appear from this return, (see TABLE XXII.) that the effective strength of the European force of the Madras army was 9553; and that the admissions into hospital, out of that number, were 17,429, or, by average, 182 per cent.

It is very certain that the whole European

force was not sick during that year; and therefore I may fairly infer, that the number of admissions into hospital must have been caused by the repeated re-admissions of men who, having been sick, had probably been discharged from medical treatment before the original disease was completely eradicated, or, perhaps, before the patient's constitution had recovered from the effects of the disease.

Although there were fewer men lost to the service this year than in any of the preceding years since 1815, yet it will be seen, from the general returns of deaths, invalids, pensioners, and discharged men, which follow these remarks, that 895 men were lost to the service; of this number 77 were discharged, 200 invalided, and 618 died. (See TABLE XXIII. and those following it.)

As the men who suffered in the last war had been disposed of* during the years 1818, 1819, and 1820, I conclude that the loss this year must have arisen from sickness alone, which I think will be borne out by the statement alluded to.

It will appear, likewise, from this Table, that the number of Europeans admitted into hospital, for all diseases, is 17,429: the number of cases of fever, liver complaints, dysentery, and cholera, amounts to 8819, but the whole numerical

* By "disposed of," I mean discharged, invalided, or pensioned.

European strength is only 9553; consequently, the number of cases of these four diseases alone amount nearly to the whole effective strength of the European army.

The general rate of sickness in a European regiment, unless under very extraordinary circumstances, or during a very sickly period, is seldom above ten per cent; this rate is termed healthy, and any thing above it is considered sickly: but I should say, that the rate of sickness in European regiments is generally under ten per cent: compared with the rate of sickness amongst natives, and including every species of disease, it is three to one.

Syphilis, rheumatism, and such other diseases as are not peculiar to any particular part of the world, form a large proportion of this number, and if neglected are calculated to produce either a heavy non-effective list, or to increase the number of discharges from the service; but the diseases which I consider to be the cause of decided loss by deaths, as well as by crowding the non-effective establishment, are fever, dysentery, and hepatitis; and it is to these that I am desirous of drawing particular attention. Here a question naturally arises, viz. From what cause does it happen, that 17,429 Europeans should be received into hospital during a period of twelve months, out of 9553 men? The answer to my mind is obvious,—that the same persons must have been

admitted again and again! In the course of these observations, I have frequently adverted to the premature discharge of men from medical treatment, after the first and most urgent symptoms only of disease have been subdued, as a cause of the ultimate loss of men to the service, as well as of the immense number of sick on the returns. If this explanation be not adopted, we must suppose that the whole European force had been sick at least twice over, which is very improbable; and therefore I think it is a fair inference, that the number of sick upon the returns depends upon the repeated re-admissions of the same sick men who have been discharged whilst convalescent, and who have returned with relapses; and I am convinced that from this cause a very heavy loss has been sustained by the public service.

It will be admitted by all those who have been in the habit of visiting hospitals or attending sick soldiers, that when a soldier feels himself relieved from the distressing or more urgent symptoms of disease, he not only becomes impatient of control and the restraint of an hospital, but is anxious to be discharged. In such cases, much depends upon the zeal, judgment, and medical tact of the regimental surgeon; but it sometimes happens that his judgment is overruled, and that men are thus dismissed from medical treatment before the functions have been restored to a healthy action; and, consequently, blame may

be attached to him without his really deserving it; because it is almost impossible to believe, or even to suppose, that any person in authority could urge the discharge of a patient from medical treatment, upon the mere caprice of a soldier's opinion, and at the risk of his health and his services; and yet I have known it asserted by authority, that "whenever a soldier declared himself capable of making a march—and the question was always put to him—that he was immediately (unless some very obvious objection offered) discharged." Now this, as a general principle, seems wrong; and if it really was the custom (which, by the way, I very much doubt,) of any person, while performing the duties of an hospital, or exercising the superintending offices of the profession, to adopt this practice, there cannot, in my mind, be two opinions on the mischief it is calculated to produce; because, although I am ready to admit that the urgent symptoms of disease may be removed, and that the patient may feel comparatively well; yet I must maintain, that, if a patient be discharged from medical treatment and hospital discipline before the functions are restored to a healthy state, relapse must follow as matter of course; and that if this be often repeated, it cannot fail to produce chronic disease, and general visceral obstruction;—circumstances which tend to load the pension and invalid lists, and occasion the discharge of men from the

service before they have been twelve or fourteen months in India.

All the profession are aware of the danger of relapse, and every medical officer is anxious to guard against it. To prevent relapse, indeed, is considered of so much importance in every well-regulated regiment, that a convalescent establishment is not only carefully attended to, but it actually forms one of the standing orders of the regiment. If, however, this regulation was zealously and rigidly adhered to, would it be possible that so many relapses could take place out of any body of men, under common circumstances, in one year? I think not—and the inference appears to me direct, that there must be some oversight or inattention to the convalescent standing regulations which may arise sometimes from one cause and sometimes from another. For instance, men are frequently impatient of the restraint of an hospital, and declare themselves well long before they really are so; many officers suspect skulking, and dislike the idea of a crowded hospital, which is not unfrequently the cause of men being prematurely discharged from medical treatment; medical officers themselves sometimes discharge men who declare themselves well, without thinking it necessary to examine them minutely; and this, without any intention of injuring the service, or the individuals belonging to it.

It requires no force of reasoning to prove the

evils that must arise from this inadvertency; and that it does exist, cannot, I think, be questioned from the data before us, because what I have already stated must be admitted, that the whole European force of this army could not, in the common course of things, have been twice in hospital during the year; and, more especially, as this year was not considered sickly.

It is very far from my wish to impute neglect to any part of the medical establishment of India, feeling, as I do, that there is no class of men more imbued with sentiments of humanity, or more zealous in the performance of their duties, than those belonging to that community; but, in order to correct an evil, we must point out its existence. This object has led me into such observations as may seem to imply carelessness in particular departments, and impatience in another branch of the service; but these have been offered without the shadow of intention to offend the feelings of any person.

From these observations, then, it appears to me, that strict attention to a convalescent establishment is requisite, in order to rally the constitution after an attack of disease: and although it has come under my knowledge where a superintending surgeon has maintained, in a public correspondence, that "*all who have been sick, or under medical treatment, can never from necessity be considered as convalescents, and subject to a fur-*

ther probationary course of recovery,"—yet, with all due deference to this authority, I must be permitted to say, that if this principle be acted upon, it cannot fail to produce all those evils which I have described, and which I wish to draw particular attention to. And if further proof were requisite to shew the necessity and importance of convalescent establishments, let any individual consult his own feelings, whether he would be likely to be able to perform his duties, on every or any occasion, immediately after an attack of sickness, even after he is able to see his friends, and capable of taking exercise; but more particularly if that attack happened to be a severe one? This is applicable to persons in the common circumstances of life, but it is infinitely more so to a soldier, whose habits render every precaution necessary, and whose duties in India expose him to such vicissitudes of weather and climate. Let us, for instance, suppose a soldier to be discharged from hospital, after having gone through a course of medical treatment of one week only, for any common disease—say a slight bowel complaint merely—and to be at once placed on duty, and obliged to walk as sentry backwards and forwards, with his musket and accoutrements, for two hours, the usual term of a soldier's duty, exposed, as he is frequently in India, to a hot sun, from 92° to 100° of Fahrenheit's thermometer,—the probable consequences are, that he will return to

his barrack fatigued; and if he can obtain a dram, or any of his friends can procure one for him, it will be his first resource;—and this, perchance, may be repeated, till considerable excitement is produced. Food is not always looked for; and if it be, it may not be such as is suited to his state, after the diet to which he had been accustomed in hospital. Thus he becomes exhausted by fatigue, excited by liquor, overloaded with food, which, though good of its kind, may not be suited to the existing state of his digestive organs; and what, I will ask, is likely to be the result but relapse? which would, in all probability, have been prevented, by bringing him more gradually to his former habits.

I could enter more at large upon this subject if it were necessary; but as my object is to benefit the public service and the cause of humanity, I hope it will be considered quite sufficient to have stated the facts, from which I have been led to the following conclusions, viz.—

That to discharge men from hospital treatment and discipline before disease has been perfectly removed, or before they have sufficiently recovered their strength, must lead to frequent relapses; and that frequent relapses will as surely lead to chronic permanent diseases, disqualify from the active duties of soldiers, load the non-effective establishment, and cause the discharge of men from the service!

If these premises be admitted, and if it be true, as I have often heard it stated, that every European soldier who comes to India costs the government one hundred pounds sterling — the following statement will shew how much the service is injured, and the expense to government increased, by a system, the defects of which appear to have been overlooked.

Although I rest my present calculation upon the returns of the year 1821, it will be seen by the returns of loss by deaths, invalids, pensioners, &c. &c. which have been taken from the returns of each regiment for seven years, that upwards of 800 men have been lost annually to the service, (see Table XXXI.) and that not fewer than 500 of them were by death.

I shall suppose that one fourth of the loss may be occasioned by this system of hospital discipline, viz. premature discharge from medical treatment.

Two hundred men, at one hundred pounds each, will occasion a loss to government of twenty thousand pounds sterling annually, exclusive of a heavy and expensive non-effective establishment, and not including passage-money for discharged men.

It will be seen by the statement alluded to, that I have made a very low estimate of this loss; my wish is to keep considerably within its limits,

and to draw, with due moderation, attention to a system so pregnant with interest to the Indian government.

If twenty thousand pounds a year is the loss upon a moderate calculation, in seven years it will amount to one hundred and forty thousand pounds, for his Majesty's and the Honourable Company's troops.

The following statement will shew the subject in a clearer point of view; and I shall not include time-expired men.

General loss of European troops belonging to his Majesty's and the Honourable East India Company's service for seven years, is

	Men.
Dead	5560
Discharged, invalided, and pensioned	3412
	8972

5560 deaths in seven years, is 794 in one year; take one fourth of this as loss by bad system .	198½
3412 discharged, invalided, and pensioned in seven years, is 487 in one year; take one fourth as above	121½
	320
At £100 each.................	100
Loss........	£32000

Loss annually for King's and Company's troops: —

	£32000
	7
In seven years....	£224000

Honourable Company's troops alone: —

1575 deaths in seven years, is 225 in one year; take one fourth as loss by bad system......	66
883 discharged, invalided, and pensioned in seven years, is 126 in one year; take one fourth, as above..............................	31
	97
At £100 each......	100
Annual...........	£9700

Annual loss for men belonging to the Honourable Company's European force alone: —

	£9700
	7
In seven years	£67900

TABLE XXIII.—*General Return of Deaths, Invalids, Pensioners, Discharged, and Time-Expired Men, belonging to His Majesty's and the Honourable Company's European Service, for the Year* 1815.

CORPS.	Effective Strength, 1st January, 1815.	Number received during the Year.	Total Strength during the Year.	Dead.	Discharged.	Invalided.	Pensioned.	Time-Expired.	Stations where each Corps was during the Year.	Annual Regimental Loss, calculated on the Total Strength.	Average Annual Loss of the Army, calculated on the Total Strength.
H. M. 22d Dragoons	705	93	798	33	2	20	...	...	January, February, and March, marching in the Ceded Districts; April and May, Camp on the Tomboodra; June to December, Bangalore	$6\frac{6}{10}$ per cent.	$9\frac{1}{10}$ per cent.
25th	840	...	840	43	1	14	...	...	Jaulnah	7	
Royal Regiment	1127	36	1163	107	9	35	...	...	Jaulnah	$12\frac{9}{10}$	
30th	889	93	982	48	7	19	...	...	Cannanore, Tomboodra, Mysore, Vellore, and Madras	$7\frac{1}{2}$	
34th	735	224	959	121	2	15	...	...	Seringapatam and Vellore	$14\frac{3}{10}$	
53d	841	...	841	13		...	...	...	Recently arrived and encamped near the Mount	$1\frac{1}{2}$	
56th	902	8	910	15	6	...	...	...	Fort St. George, removed to the Isle of France	$2\frac{3}{10}$	
69th	778	...	778	41	1	35	...	...	Bellary	$9\frac{8}{10}$	
80th	754	6	760	37	20	...	...	...	Quilon	$7\frac{1}{2}$	
84th	1209	7	1216	27	16	39	...	...	Karnaul, Bangalore, and Ceded Districts	$6\frac{7}{10}$	
86th	822	252	1074	66	3	79	...	...	Masulipatam	$13\frac{7}{10}$	
89th	804	46	850	21	2	24	...	...	Bangalore and Cannanore	$5\frac{1}{2}$	
H. C. Horse Artillery	304	...	304	27	4	1	...	...	Jaulnah Force	$7\frac{6}{10}$	
1st Battalion	654	...	654	37	38	27	11	...	Mount	$17\frac{2}{10}$	
2d Battalion	714	...	714	45	28	32	2	...	Mount	$14\frac{9}{10}$	
M. E. Regiment	783	15	798	41	23	13	...	...	Trichinopoly	$9\frac{6}{10}$	
Total	12861	780	13641	722	162	353	13				

I have marked the Station of the Artillery at the Mount, because their Head Quarters were stationed there, and the general Returns dated from the Mount; but it must be stated, that the Artillery are divided into various detachments, serving in the different Divisions of the Army, and that there are seldom more than two or three hundred men at the Mount: how they are distributed will be seen in the Returns of the different Divisions of the Army, where the numbers are stated belonging to each Station.

TABLE XXIV.— *General Return of Deaths, Invalids, Pensioners, Discharged, and Time-Expired Men, belonging to His Majesty's and the Honourable Company's European Service, for the Year* 1816.

CORPS.	Effective Strength, 1st January, 1816.	Number Received during the Year.	Total Strength during the Year.	Dead.	Discharged.	Invalided.	Pensioned.	Time-Expired.	Stations where each Corps was during the Year.	Annual Regimental Loss, calculated on the Total Strength.	Average Annual Loss of the Army, calculated on the Total Strength.
H. M. 22d Dragoons......	710	8	718	20	2	...	1	..	Bangalore.	$3\frac{8}{10}$ per cent.	$8\frac{2}{10}$ per cent.
25th...	771	3	774	45	11	18	...	...	Centre Division	$8\frac{9}{10}$	
Royal Regiment...	1058	249	1307	79	24	43	...	...	Jaulnah	$11\frac{1}{10}$	
30th...	924	99	1023	39	6	26	...	...	Madras	$6\frac{3}{10}$	
34th...	835	53	888	44	1	22	...	...	Vellore	$7\frac{5}{10}$	
53d...	851	283	1134	54	1	72	...	1	Wallajahbad, Bangalore, and Trichinopoly	$11\frac{1}{10}$	
69th...	724	1	725	53	8	33	...	20	Ceded Districts, and Bangalore	$12\frac{9}{10}$	
80th...	713	8	721	20	1	4	...	...	Quilon and Trichinopoly	$3\frac{4}{10}$	
84th...	1132	1	1133	37	7	52	...	26	Ceded Districts	$10\frac{7}{10}$	
86th...	950	1	951	49	...	6	..	2	Hyderabad and Masulipatam	$5\frac{9}{10}$	
89th...	815	236	1051	34	13	20	...	...	Cannanore and Quilon	$6\frac{3}{10}$	
H. C. Horse Artillery....	361	127	488	7	16	...	...	...	Jaulnah	$4\frac{7}{10}$	
1st Battalion.......	580	207	787	32	14	16	4	...	Mount	$8\frac{6}{10}$	
2d Battalion.......	555	245	800	41	19	18	10	...	Mount	11	
M. E. Regiment...	706	319	1025	48	6	1	2	...	Trichinopoly and Ceded Districts	$5\frac{1}{2}$	
Total.	11685	1840	13525	582	129	331	17	49			

TABLE XXV.—*General Return of Deaths, Invalids, Pensioners, Discharged, and Time-Expired Men, belonging to His Majesty's and the Honourable Company's European Service, for the Year* 1817.

CORPS.	Effective Strength, 1st January, 1817.	Number Received during the Year.	Total Strength during the Year.	Dead.	Discharged.	Invalided.	Pensioned.	Time-Expired.	Stations where each Corps was during the Year.	Annual Regimental Loss, calculated on the Total Strength.	Average Annual Loss of the Army, calculated on the Total Strength.
H. M. 22d Dragoons......	643	17	660	55	2	39	...	...	Camp, Ceded Districts, and Dooab	$14\frac{8}{10}$ per cent.	11 per cent.
25th..................	669	5	674	21	18	53	...	5	Centre Division..................	$14\frac{4}{10}$	
Royal Regiment...	1166	3	1169	143	16	51	...	3	Camp Hyderabad Force..................	$18\frac{2}{10}$	
30th	932	63	995	33	140	...	...	...	Madras	$17\frac{3}{10}$	
34th..................	898	80	978	62	4	44	...	..	Centre Division—Vellore..................	$11\frac{2}{10}$	
53d..................	1023	278	1301	76	8	35	...	...	Trichinopoly	$9\frac{1}{10}$	
69th..................	736	337	1073	39	23	18	...	4	Bangalore..................	$7\frac{8}{10}$	
80th..................	195	...	195	6	...	...	...	...	This Regiment was drafted	3	
84th..................	1001	2	1003	23	10	26	...	13	Ceded Districts—Bellary	$7\frac{1}{10}$	
86th..................	935	7	942	45	7	2	...	...	Masulipatam..................	$5\frac{7}{10}$	
89th..................	849	172	1021	49	28	8	...	...	Quilon..................	$8\frac{3}{10}$	
H. C. Horse Artillery.....	456	133	589	32	...	...	...	2	Kandeesh, Dooab, Ellichapore, Jaulnah, Mahidpore, and Nagpore	$5\frac{7}{10}$	
1st Battalion.......	608	81	689	33	3	2	1	2	Mount..................	$5\frac{9}{10}$	
2d Battalion.......	632	5	637	39	2	...	...	4	Mount..................	7	
M. E. Regiment...	891	314	1205	115	31	51	7	10	Karnoul, Hyderabad, and Mahidpore..................	$17\frac{8}{10}$	
Total..................	11634	1497	13131	771	292	329	8	43			

TABLE XXVI. — *General Return of Deaths, Invalids, Pensioners, Discharged, and Time-Expired Men, belonging to his Majesty's and the Honourable Company's European Service, for the Year* 1818.

CORPS.	Effective Strength, 1st January, 1818.	Number Received during the Year.	Total Strength during the Year.	Dead.	Discharged.	Invalided.	Pensioned.	Time-Expired.	Stations where each Corps was during the Year.	Annual Regimental Loss, calculated on the Total Strength.	Average Annual Loss of the Army, calculated on the Total Strength.
H. M. 22d Dragoons	591	5	596	37	1	21	...	...	Field Service in the Mahratta Country, from January to June; at Seroor, from June to December	$9\frac{8}{10}$ per cent.	$13\frac{5}{10}$ per cent
25th	584	...	584	33	2	40	...	12	Bangalore and Arcot	$14\frac{8}{10}$	
Royal Regiment	957	..	957	150	...	37	...	...	Field Service	$19\frac{5}{10}$	
30th	866	205	1071	61	1	84	...	...	Madras	$13\frac{6}{10}$	
34th	895	20	915	139	2	26	...	...	Field Service—Bellary and Bangalore	$19\frac{3}{10}$	
46th	927	...	927	30	3	...	...	...	Centre Division	$3\frac{1}{2}$	
53d	1245	30	1275	110	1	98	...	...	Trichinopoly	$16\frac{3}{10}$	
69th	1004	12	1016	96	1	40	...	2	Bangalore	$13\frac{6}{10}$	
84th	920	6	926	69	10	25	...	...	Bellary	$11\frac{2}{10}$	
86th	912	3	915	82	1	...	...	...	Masulipatam and Wallajabad	9	
89th	1078	6	1084	69	27	10	...	...	Quilon	$9\frac{7}{10}$	
H. C. Horse Artillery	442	43	485	41	...	...	...	...	Field Service	$8\frac{4}{10}$	
1st Battalion	525	44	569	71	...	26	6	...	Mount	$18\frac{1}{10}$	
2d Battalion	615	45	660	75	5	22	...	...	Mount	$15\frac{4}{10}$	
M. E. Regiment	987	162	1149	206	1	...	...	...	Field Service—Kandeesh and Nagpore	18	
Total	12548	581	13129	1269	55	429	6	14			

Table XXVII.—General Return of Deaths, Invalids, Pensioners, Discharged, and Time-Expired Men, belonging to his Majesty's and the Honourable Company's European Service, for the Year 1819.

CORPS.	Effective Strength, 1st January, 1819.	Number Received during the Year.	Total Strength during the Year.	Dead.	Discharged.	Invalided.	Pensioned.	Time-Expired.	Stations where each Corps was during the Year.	Annual Regimental Loss, calculated on the Total Strength.	Average Annual Loss of the Army, calculated on the Total Strength.
H. M. 13th Dragoons	458	401	759	45	...	...	...	...	Just arrived from England, at Madras	$5\frac{9}{10}$ per cent.	$11\frac{7}{10}$ per cent
22d	495	131	626	42	...	15	...	...	Service in the Southern Mahratta Country till June, at Bangalore in July, and Madras in December	$9\frac{1}{10}$	
25th	509	2	511	7	...	...	...	18	Drafted into other Regiments..........	8	
Royal Regiment...	934	62	996	123	12	57	...	6	Centre Division	$19\frac{8}{10}$	
30th	936	26	962	81	26	39	...	...	Hyderabad	$13\frac{2}{10}$	
34th	928	10	938	38	4	25	...	11	Bangalore	$8\frac{3}{10}$	
46th	927	1	928	29	55	22	2	...	Madras	$11\frac{6}{10}$	
53d	1045	4	1049	77	...	33	...	2	Trichinopoly	$10\frac{1}{2}$	
69th	868	281	1149	65	2	23	...	10	Cannanore	$8\frac{7}{10}$	
84th	825	5	830	19	...	11	...	5	Drafted into other Regiments in July	$4\frac{2}{10}$	
86th	648	...	648	40	...	...	...	32	Ditto ditto in April	$6\frac{1}{10}$	
89th	969	1	970	46	5	12	...	...	Quilon	$6\frac{4}{10}$	
H. C. Horse Artillery ...	426	109	535	43	8	14	10	...	Field Service	14	
1st Battalion	537	159	696	59	20	28	4	...	Mount..........	$15\frac{9}{10}$	
2d..........	544	176	790	68	6	7	2	...	Mount...	$11\frac{5}{10}$	
M. E. Regiment...	798	261	1059	181	62	1	22	...	Mouthie, Ellichapore, and Asseer-Ghur	$25\frac{1}{10}$	
Total	11747	1629	13376	963	200	287	40	84			

TABLE XXVIII.—General Return of Deaths, Invalids, Pensioners, Discharged, and Time-Expired Men, belonging to His Majesty's and the Honourable Company's European Service, for the Year 1820.

CORPS.	Effective Strength, 1st January, 1820.	Number Received during the Year.	Total Strength during the Year.	Dead.	Discharged.	Invalided.	Pensioned.	Time-Expired.	Stations where each Corps was during the Year.	Annual Regimental Loss, calculated on the Total Strength.	Average Annual Loss of the Army, calculated on the Total Strength.
H. M. 13th Dragoons	716	8	724	46	3	9	...	...	Centre Division	8 per cent.	$10\frac{3}{10}$ per cent
22d	95	...	95	2	5	11	...	...	Embarked for Europe	$14\frac{7}{10}$	
Royal Regiment	816	243	1059	46	48	21	1	...	Trichinopoly	$10\frac{9}{10}$	
30th	895	51	946	73	10	...	...	...	Hyderabad	$8\frac{7}{10}$	
34th	888	5	893	37	15	20	...	...	Bangalore and Madras	8	
46th	1023	76	1099	37	17	1	...	...	Madras and Bellary	5	
53d	934	62	996	82	11	28	...	...	Bellary and Bangalore	$12\frac{1}{10}$	
69th	1055	107	1162	61	20	5	...	...	Cannanore	$8\frac{2}{10}$	
89th	1035	95	1130	30	12	26	...	...	Quilon	6	
H. C. Horse Artillery	395	23	418	44	43	10	8	...	Field Service	$25\frac{1}{10}$	
1st Battalion	451	214	665	59	17	18	4	2	Mount	15	
2d	576	192	768	43	48	22	3	...	Mount	$15\frac{1}{10}$	
M. E. Regiment	755	106	861	75	9	21	8	...	Asseer-Ghur	$13\frac{1}{10}$	
Total	9634	1182	10816	635	258	202	24	2			

TABLE XXIX.—*General Return of Deaths, Invalids, Pensioners, Discharged, and Time-Expired Men, belonging to His Majesty's and the Honourable Company's European Service, for the Year* 1821.

CORPS.	Effective Strength, 1st January, 1821.	Number Received during the Year.	Total Strength during the Year.	Dead.	Discharged.	Invalided.	Pensioned.	Time-Expired.	Stations where each Corps was during the Year.	Annual Regimental Loss, calculated on the Total Strength.	Average Annual Loss of the Army, calculated on the Total Strength.
H. M. 13th Dragoons	672	7	679	29	6	7	...	...	Bangalore	$6\frac{1}{10}$ per cent.	$8\frac{5}{10}$ per cent.
Royal Regiment	950	93	1043	82	3	18	...	...	Trichinopoly	$9\frac{8}{10}$	
30th	868	115	983	66	2	26	...	...	Hyderabad	$9\frac{1}{2}$	
34th	851	6	857	44	2	35	...	...	Madras	$9\frac{4}{10}$	
46th	961	2	963	58	12	11	...	...	Bellary	$8\frac{4}{10}$	
53d	890	56	946	37	5	28	...	...	Bangalore	$7\frac{4}{10}$	
69th	1077	11	1088	42	22	31	...	...	Cannanore	$8\frac{7}{10}$	
89th	962	46	1008	37	4	40	...	...	Quilon	8	
H. C. Horse Artillery	475	36	511	64	5	4	...	...	Mount and Field Service	$14\frac{2}{10}$	
1st Battalion	693	106	799	46	2	...	...	...	Mount	6	
2d	533	233	766	35	3	...	...	...	Mount	$4\frac{9}{10}$	
M. E. Regiment	738	146	884	78	11	..	...	...	Nagpore	10	
Total	9670	857	10527	618	77	200	...	...			

TABLE XXX.—*Abstract of Annual Loss in the Army of European Forces, by Deaths, Discharges, Invalided, Pensioned, and Time-Expired Men, both in His Majesty's and in the Honourable Company's Services, under the* PRESIDENCY *of* FORT ST. GEORGE, *for Seven Years, from* 1815 *to* 1821 *inclusive.*

YEARS.	Effective Strength of the Army.	Annual Loss in the Army by Deaths.	Annual Loss of Men by Discharges.	Annual Loss of Men by Invalided.	Annual Loss of Men by Pensioned.	Annual Loss by Time-Expired Men.	Total Loss of Men by Invalids, Pensioned, and Time-Expired Men, in Seven Years.	Grand Total Loss by Deaths, Discharged, Invalided, Pensioned, and Time-Expired Men.	Rate of Loss by Death, per Annum.	Rate of Loss by Invalided, Pensioned, and Time-Expired Men.	Total Rate of Loss by Deaths, Invaliding, &c. &c.
1815..........	13641	722	162	353	13	......	528	1250	$5\frac{3}{10}$ per cent.	$3\frac{9}{10}$ per cent.	$9\frac{2}{10}$ per cent.
1816..........	13525	582	129	331	17	49	526	1108	$4\frac{3}{10}$	$3\frac{9}{10}$	$8\frac{2}{10}$ ......
1817..........	13131	771	292	329	8	43	572	1443	$5\frac{9}{10}$	$5\frac{1}{10}$	11 ......
1818..........	13129	1269	55	429	6	14	504	1773	$9\frac{7}{10}$	$3\frac{8}{10}$	$13\frac{5}{10}$ ......
1819..........	13376	963	200	287	40	84	611	1574	$7\frac{2}{10}$	$4\frac{5}{10}$	$11\frac{7}{10}$ ......
1820	10816	635	258	202	24	2	486	1121	$5\frac{8}{10}$	$4\frac{5}{10}$	$10\frac{3}{10}$ ......
1821	10527	618	77	200	......	......	277	895	$5\frac{9}{10}$	$2\frac{6}{10}$	$8\frac{5}{10}$ ......
Total	88145	5560	1173	2131	108	192	3604	9164	$44\frac{1}{10}$	$28\frac{3}{10}$	$72\frac{4}{10}$
Average of Seven Years, per Annum	$12592\frac{1}{10}$	$794\frac{3}{10}$	$167\frac{6}{10}$	$304\frac{4}{10}$	$15\frac{4}{10}$	$27\frac{4}{10}$	$514\frac{9}{10}$	$1309\frac{1}{10}$	$6\frac{3}{10}$	4	$10\frac{3}{10}$

Average Strength of the Army, upon 88,145 Men, in Seven Years, is .... 12592 per Annum.
Average Loss upon 5560 Men by Death, in Seven Years, is .... $794\frac{2}{10}$
Average Loss upon 3604 by Discharges, Invalids, Pensioners, and Time-Expired Men, in Seven Years, is... $514\frac{9}{10}$

Total Average Loss of Men per Annum .... $1309\frac{1}{10}$

Average Loss by Death per Annum .... $6\frac{3}{10}$ per Cent.
Average Loss by Discharges, Invalids, Pensioners, &c. 4

Total Loss by Death, including Discharges, Invalids, Pensioners, and Time-Expired Men, per Annum ...... $10\frac{3}{10}$

Average Loss by Death of Diseases taken from the Medical Returns, 5191 in Seven Years, is 741 per Annum, or $5\frac{9}{10}$ per Cent per Annum.

TABLE XXXI.—*Abstract of the General Loss of Men belonging to His* MAJESTY'S *and the* HONOURABLE COMPANY'S *European Troops, in Deaths, Discharged from the Service, Invalids, Pensioners, and Time-Expired Men, for a period of Seven Years, from* 1st *January*, 1815, *to* 31*st December*, 1821.

Total Effective Strength, on the 1st January, 1815.	Total Number of Recruits received from England, from 1st Jan. 1815, to 31st December, 1821.	Grand Total.	Total of Deaths.	Total of Discharged	Total Invalided.	Total Pensioned.	Total Time-Expired.	Grand Total of Loss.
12861	8366	21227	5560	1173	2131	108	192	9164

The following result of a calculation is a medium taken from the number of casualties that have occurred in three years, viz. 1813, 1814, and 1815, in a class of European society the most exposed to the climate.

(Signed) MILES.

Madras Cases, 21st October, 1816.

Of 1366 European gentlemen, 115 died in the above-mentioned period,—not quite four per cent per annum. Supposing the above number were divided into three classes, the casualties have taken place nearly in the following proportions:

First Class.	Second Class.	Third Class.
Resident in the Peninsula Twelve Years, and under.	Resident in the Peninsula above Twelve Years, and not exceeding eighteen.	Resident in the Peninsula Eighteen Years, and upwards.
Nearly $4\frac{2}{3}$ per cent. per annum.	Something less than $3\frac{1}{8}$ per cent.	Rather more than $2\frac{1}{2}$ per cent.

The annexed statement will shew the unusual mortality which prevailed in the Madras army for the year ending the 1st of August, 1820, and that the deaths have amounted to very nearly six per cent. Of 1260 European officers, the

casualties by death, in twelve months, have amounted to seventy-four.

The Cavalry has lost in the proportion of nearly	$6\frac{1}{3}$	per cent.
The Artillery in the proportion of	$3\frac{1}{4}$	
The Engineers	0	
The Infantry nearly in the proportion of	$6\frac{1}{4}$	
Medical Officers, upwards of	$6\frac{1}{3}$	

These latter having suffered more than any of the other classes enumerated.

Concluding Observations on the foregoing Reports, with reference to the Prevailing Diseases in the more Northerly Provinces of India, under the Bengal and Bombay Presidencies.

Fevers.—From the official Returns of the different Medical Boards, as well as from other sources of information, I conclude that fevers are not so prevalent in the districts under the Madras Presidency as in the majority of those under the Presidencies of Bengal and Bombay. This seems to arise chiefly from the circumstances connected with the climates and localities of the different provinces of this extensive empire. The greater number of the districts under the Madras Presidency possess a drier and less absorbent and alluvial soil, with a less abundant, wild vegetation: and the climate, although upon the whole much warmer, is not so moist as in the countries under the other Presidencies. But these very circumstances of climate and locality of the southern provinces of India, although tending to diminish the number, and to vary the type, of fevers, increase the frequency of hepatic diseases, as may be seen by referring to the account given of the climates and diseases of the

different districts composing the three Presidencies, contained in the first book, and in the Appendix, of the "Researches on the Diseases of India," &c.

In the southern and drier provinces of India, fevers assume more frequently continued, remittent, and inflammatory forms, especially amongst recent comers to the country; and determination of blood to the head and liver is oftener present in them than in the fevers of the northern countries of the empire. On the other hand, intermittents, with congestions of the spleen, or affections of the thoracic viscera, are more frequent in the districts under the Bengal and Bombay Presidencies than in those belonging to Madras.

Fever, as observed in India, assumes various forms or types, owing chiefly to the constitution or habit of body of the patient, the period he has resided in the country, the season of the year, and to the causes which have been most influential in producing it.

The *continued type* of fever is most common during the hot season, and amongst recent visitors of the country. Its form is characterised by great vascular excitement at its commencement, either with or without determinations to the head, liver, or bowels. Cerebral and hepatic complications are the most frequent in the fevers occurring in the districts under the Madras Presidency. In the more northerly provinces of India, in

addition to these complications, continued fever often presents those of the bowels and lungs.

If the excitement which characterises the early stages of this fever, and the local determinations, be not moderated by active treatment, as frequently insisted upon in the foreging reports, exhaustion of the energies of the system, and structural change in the organs chiefly affected, soon supervene.

In order to prevent these consequences, general or local depletions, or both, copious alvine evacuations procured by means of calomel and cooling purgatives, the cold affusion, diaphoretics, and a strict antiphlogistic regimen, are required. When the early stages of the fever have been neglected, or injudiciously treated, and local congestions have taken place, the application of leeches, followed by blisters, &c. is generally beneficial; and in every case active purgation is necessary.

If symptoms of exhaustion make their appearance, purgatives and warm diaphoretics are still requisite; but the purgatives, instead of being of a cooling nature, as are most serviceable in the early stage of the disease, should be warm, combined with antispasmodics, and with diffusible stimulants and tonics. But care should be taken to ascertain whether or no the symptoms of exhaustion or debility present depend upon congestion of some vital organ; for if they owe their origin to this cause, the use of stimulants

and tonics would be premature, and calculated to convert the congestion into inflammation. If congestion, or even the least evidence of congestion, be present, local depletions should be adopted and carried to the length which the circumstances of the case may warrant, and purgatives and diaphoretics should be duly administered until the local disturbance is removed, when tonics, or other means calculated to support the energies of the frame, may be exhibited, and conjoined with warm aperients and diaphoretics.

During some seasons, in certain low wooded or marshy localities, and in some constitutions of deficient energy and tone, the continued form of fever rapidly assumes a typhoid or adynamic form. This is also frequently the case when the morbid secretions are allowed to remain during the early stage of the disease in the *prima via*. When the fever assumes this form, either from its commencement or soon afterwards, active purgation is not the less requisite; but medicines of this nature should be combined, under such circumstances, with warm tonics and aromatics; and great attention should be paid to the supporting of the powers of life under the purgative operation, by means of stimulants, employed both internally and externally.

The *remittent* and *intermittent* types of fever are, upon the whole, the most common in India, especially amongst old residenters and natives; and in the former class they are very generally observed

complicated with local disorders, which supervene and increase during the course of the disease, especially when it is inactively or injudiciously treated at its commencement. These fevers are most prevalent during the rainy and cold seasons.

The *inflammatory* and *bilious* forms of remittent fever are most frequently observed in the southern districts of India; and during the hot season, in the northern provinces. In the districts under the Bengal and Bombay Presidencies, congestions and enlargements of the spleen, and affections of the pulmonary organs, are oftener seen to supervene in the course of these fevers than in the provinces under the Madras government.

The inflammatory and bilious forms of remittent fever are generally attended with marked signs of determination to the head, liver, stomach, and bowels, especially to the two former, and require general or local blood-letting, or both, to an extent which the particular circumstances of the case point out, together with the other antiphlogistic means already alluded to. But this treatment, in order to be beneficial, or even that it may not prove detrimental, must be employed during the early stage of the disease, or before symptoms of exhaustion supervene. Under every circumstance, however, the steady employment of full doses of calomel and purgatives is requisite; and as soon as signs of vascular

excitement, during the remissions, have subsided, and when there are no symptoms of local congestion or determination, especially to the head and liver, bark, in any of its forms of preparation and combination, will be exhibited with great advantage. But even during the exhibition of the bark, care should be taken to preserve an open state of the bowels, by means of a dose of calomel at bed-time and a purgative draught the following morning.

When the disease seems to be accompanied with typhoid symptoms or signs of the adynamic state, or when these symptoms supervene in its progress, they must be met by the energetic use of tonics and stimulants, either alternated or combined with purgatives or laxatives, as already insisted upon when remarking upon this state of the system as connected with the continued form of fever.

If the remittent type of fever has been judiciously treated at the commencement, typhoid symptoms, or those indicating malignancy, seldom appear in its progress; and if these symptoms seem to accompany the fever from its commencement, they may be chiefly referred to congestion in some vital organ, which will generally be removed by means of purgatives and local depletions carefully employed, followed by blisters and warm diaphoretics, and the cautious exhibition of diffusible stimulants.

The *intermittent* types of fever generally require the exhibition of bark; but they may be cured, or the disease at least much ameliorated, by the exhibition of full doses of calomel given at bed-time, each dose of which should be followed by an active purgative draught in the morning, and its operation assisted by a laxative enema. The use of enemata, in order to assist the action of laxative or purgative medicines given by the mouth, is extremely serviceable in every form and type of fever, and should never be neglected. The full operation of these remedies will often of itself remove slighter forms of ague; and in no case should any of the varieties of the disease, and, least of all, its complications with congestion or visceral obstruction, be treated without commencing with the exhibition of these medicines. After their satisfactory operation, and when local determinations and congestions have been removed by their aid and by local depletions, the bark may be exhibited in doses, and in forms of combination, which the circumstances of particular cases will point out to the practitioner.

In the majority of cases of ague, as well as of the continued and remittent types of fever, when the liver is not particularly diseased, the treatment will be advantageously commenced with an emetic, after the full operation of which, calomel, followed by purgatives and laxative enemata, may be exhibited.

When intermittents are complicated with local congestions and obstructions, local depletions, the steady use of deobstruent purgatives and aperients, and external irritation, are requisite, as in the other types of fever; but in no case should any of the preparations of bark be prescribed until these complications have been removed, unless in such cases as may be complicated with obstruction or enlargement of the spleen, where bark and other tonics will be exhibited with advantage, in combination with purgatives or laxatives.

The *sequelæ* of the various forms and types of fever require attention. These are, obstructions and enlargements of the liver, spleen, and pancreas, bowel complaints, and occasionally affections of the lungs. They generally either follow fevers which have been neglected or improperly treated, or they supervene when the patient is obliged to continue in the unwholesome locality in which the disease originated, during both the treatment and convalescence.

In affections of this description it will generally be beneficial to remove the patient to as healthy a situation as may be within his reach; or when this cannot be attained, a sea voyage will prove of much service to him; but other curative means should not be neglected. Local depletions, to an extent which the state of the patient may warrant, followed by blisters, the nitro-muriatic wash, and the regular use of deobstruent

purgatives, or laxatives and enemata, are generally indispensable. The diet of the patient ought also to be strictly prescribed, and all the causes of disease which abound in hot climates carefully avoided.

Affections of the thoracic viscera seldom supervene to fever in the southern provinces of India; but they are not uncommon in the northern districts. They require local depletions, followed by antimonial diaphoretics, external irritants, and a regulated temperature. Enlargements and obstructions of the spleen, consequent on fevers, are also more frequent in the northern than in the southern provinces of India. These lesions are most successfully treated by the steady employment of purgatives or laxatives in conjunction with tonics, and the external as well as the internal use of the nitro-muriatic acid solution.

Disease of the structure of the liver is a very frequent consequence, as well as concomitant, of fever, especially in the southern provinces of India. The practitioner should be always prepared for such an occurrence; and during the treatment of every form and type of fever should carefully watch for the appearance of the symptoms which indicate the approach of lesion of the hepatic apparatus. With this view, the state of the abdomen and of the evacuations ought to be narrowly examined; and all the signs which indi-

cate disorder in this quarter should be most assiduously looked after and carefully weighed.

After attacks of fever, dysentery not infrequently makes its appearance. This occurrence most commonly takes place when active purgation has not been instituted during the attacks of fever, of which the dysenteric affection appears as the sequela; and when the patient is exposed to great vicissitudes of temperature, to cold night air, and to air loaded with marshy exhalations, during convalescence. Amongst the soldiery in India, dysentery is also very frequently produced during convalescence from fevers, or soon after they have been discharged from hospital, by indulgence in the spirituous liquors of the country, and by errors of diet. Night duty, under these circumstances, is also not an infrequent cause of its supervention; and hence the propriety of not discharging men from hospital at a too early period of convalescence; and, when discharged, of placing them under a certain degree of control, until their health is fully established.

Dysentery.—I have but little to add at this place to what I have stated respecting dysentery in the course of the remarks appended to the Tables in the foregoing Reports. The reader who is desirous of obtaining more detailed information upon this disease as it occurs in India, will find the subject discussed at greater length in the "Researches into the Diseases of India," Vol. II.

I shall merely remark here, that although dysentery is much more prevalent in some districts and localities in India than in others, yet the percentage of admissions of this disease, in the effective strength of the army, is nearly the same in the returns of the medical boards of the different Presidencies.

This disease proceeds from various causes, which, although often concurring in its production, yet act with different degrees of activity in different parts of India. In some places it is more evidently dependent upon great vicissitudes of temperature, and exposure to cold night air, loaded with humidity and unwholesome emanations, than in other districts. In many localities it is more evidently the result of exhalations from a low, marshy, or moist soil, than of any other cause. The foregoing causes are in full activity in many of the provinces under the Bengal and Bombay Presidencies, and in some of the higher and central districts of the empire. In some parts this disease is more evidently produced by the use of spirituous and deleterious liquors and improper diet, and in others it is dependent upon organic disease of the liver. These latter sources are, perhaps, even more productive of the disease in the southern than in the northern provinces of India.

In the great majority of cases of this disease, local depletions are requisite; and in some,

especially in recent visitors of the climate, they should be preceded by general blood-letting. After the leeches applied to the abdomen have ceased to bleed, hot poultices frequently renewed, are particularly serviceable; and as soon as the inflammatory stage of the disease is subdued by the above means, blisters will be afterwards applied with advantage. Full doses of calomel should be given at bed-time, from the commencement of the attack, and followed in the morning by a purgative draught, the operation of which will be very much assisted by emollient injections, administered frequently throughout the day. At the same time, diaphoretics, as the compound powder of ipecacuanha, the liquor ammoniæ acetatis, camphor, spiritus ætheris nitrici, &c. may be given from time to time, in order to determine to the surface of the body, and equalise the circulation.

When the tenesmus is urgent, the application of leeches over the sacrum and on the perinæum, will generally give relief: and small emollient and anodyne injections will afford considerable ease. Besides injections of this description, infusions of ipecacuanha may often be resorted to with advantage.

If pain be felt in any part of the course of the colon, or in the region of the liver, during the progress of the treatment, it should be immediately attacked by the application of a few leeches, which

ought to be followed by the adoption of the means already stated. The warm bath also is often serviceable under these circumstances, especially when it is immediately followed by energetic friction of the surface of the body.

Purgatives, especially when following the exhibition of calomel, are requisite in the majority of cases of this disease, but they should be selected with judgment. The irritating and resinous purgatives are generally hurtful, while the saline procure merely watery motions, and exhaust the strength of the patient. Those which I have generally preferred are, castor-oil, or the supertartrate of potash, with jalap. When there is much debility, the compound infusions of gentian and senna, with salts and compound tincture of cardamoms, are often very serviceable. All aperient medicines ought to be given to the patient early in the morning, in a full and efficient dose, and the mercurial preparations, either alone, or with opium, or Dover's powder, should be exhibited at bed-time, in order that the patient's rest may not be disturbed by the operation of the purgatives, and that his strength be preserved as much as possible.

A few hours after the exhibition of the purgatives in the morning, its operation should be promoted by the injection of an emollient and laxative enema, which may be repeated in two or three hours, if it be requisite; and if there

be much distress and straining still present, and especially if the purgative have operated, an anodyne injection may be also exhibited at bed-time. In all cases of this disease, especially when it assumes a chronic form, flannel bandages should be kept around the abdomen, and the patient's diet and regimen strictly prescribed. For further information as to the treatment of this disease, I may refer to the preceding Reports, and to the remarks offered upon this subject in the last part of this work, on the employment of calomel in the diseases of India. The reader will also find most of the topics relating to dysentery in its various forms, fully discussed in the second volume of the "Researches into the Diseases of India and of Warm Climates."

Hepatic Diseases.—The remarks which I have offered upon these diseases in the preceding reports, and the observations contained in the concluding part of the work, on the symptoms and treatment of chronic disease and abscess of the liver, render it less necessary for me to enlarge here upon this subject. Diseases of the liver are certainly more prevalent in the southern than in the northern provinces of India. This is shewn in the reports from the medical boards of the different Presidencies. In the provinces under the Bengal Presidency, diseases of the liver, taking place as a primary disease, are only about 6 per cent in the effective strength of the

army; whilst in the districts under the Madras Presidency they are 17 per cent. But this percentage cannot be considered as indicating the proportion of cases in which the liver is actually diseased; for this organ frequently becomes the chief seat of disorder, and even of organic lesion, in the progress of both fever and dysentery.

Pulmonary Complaints. — Affections of the respiratory organs are seldom observed in the southern provinces of India. But in the more northern provinces, as well as in the central and more elevated districts, they are not infrequent, especially during the cold season, both amongst natives and Europeans. They are frequently complicated with hepatic derangements, and they occasionally are attendant upon attacks of fever.

After fully evacuating the biliary secretions and alvine accumulations, by means of emetics, and full doses of calomel and purgatives, they generally yield to antimonial and other diaphoretics. If the pulmonary affections be inflammatory, blood-letting from the arm, followed by leeches, should be actively employed at the commencement of the attack, and before the other means of cure are prescribed. In the natives, the application of leeches only is all the vascular depletion that is necessary, with the decided employment of antimonial diaphoretics.

Rheumatism is extremely frequent amongst both Europeans and natives, especially in those

districts of India which experience the greatest vicissitudes of season, and diurnal range of temperature. It is more particularly so during the cold and rainy seasons. With respect to its pathological relations, it seems frequently connected with torpor of the biliary functions, congestions of the hepatic veins, and accumulations of bile upon the biliary organs.

After acting upon the hepatic secretions, and removing morbid accumulations from the bowels, I have found the most decided advantage obtained from the employment of bark and other tonics, combined with diaphoretics and antispasmodics. But during the administration of these kinds of remedies, the biliary secretions should be promoted, and the alvine excretions carried off by the exhibition of calomel, followed by purgatives and laxatives. At the same time, a regular state of the temperature of the surface should be promoted by flannel worn next the skin, and by avoiding exposure to cold and moisture.

PART III.

PRACTICAL OBSERVATIONS

ON THE

EFFECTS OF CALOMEL

ON THE MUCOUS SURFACE AND SECRETIONS OF THE

ALIMENTARY CANAL;

AND ON

THE USE OF THIS REMEDY IN DISEASE,

MORE PARTICULARLY IN

THE DISEASES OF INDIA.

ALSO

INQUIRIES INTO THE SYMPTOMS AND TREATMENT

OF

CHRONIC DISEASE,

AND

ABSCESS OF THE LIVER.

SECTION I.

Introductory Remarks respecting the Doses in which Calomel may be prescribed, &c.

Although this preparation has been much employed in medicine during the two last centuries, yet practitioners seem not to have arrived at any determinate idea respecting the extent to which it may be advantageously given, or the mode of administering it. When calomel was first employed, under the terms of *Draco mitigatus, Manna Metallorum, Sublimatum dulce, Mercurius dulcis sublimatus*, &c., it was used chiefly as an active purgative, either alone, or in combination with other medicines of the same class; and we find, on reference to the medical authors of the seventeenth, and commencement of the last century, that it was chiefly resorted to when they wished to procure a full evacuation of the biliary and other alvine secretions, or to re-establish any natural evacuation, which had been prematurely put a stop to. But it is somewhat singular, that the mode of administering it which these authors adopted, should have been so soon almost entirely forgotten, and that it was in every respect the same as that which has been suggested at the present day by several writers.

I shall briefly refer to a few authors who seem to have entertained very correct views as to the mode of administering this remedy, and under whose authority, in addition to my own observation, I will shelter myself, when I at once state the proposition which it is the purpose of this article to establish, namely, that when the use of calomel is clearly indicated, it is most beneficial in large doses, generally at not less than twenty-four hours between the administration of each dose.

Horstius* stated, that the "Mercurius dulcificatus" may be given in doses of one scruple, or half a drachm, "*ad viscidos humores magis attenuandos;*" and Deleboe Sylvius† recommended it in the same doses as an attenuating purgative. Wepfer‡ prescribed it in doses of twenty grains, in combination with other purgatives, in affections of the head. Dr. Friend|| advised it in scruple doses, in conjunction with purgatives and emmenagogues in emansio and obstructio mensium. Schroder§ has expressly stated, that "Mercurius dulcis vulgaris, draco mitigatus, omnes humores noxios, sine perturbatione laude expurgat, unde

* Opera Omnia, Vol. II. p. 480. 1661.

† Opera Francisci Deleboe Sylvii, p. 98. Amst. 1680.

‡ Observationes Medico-Practicæ, p. 120–124. 1727.

|| Opera Omnia, p. 112 et seq.

§ Pharmacopœia Medico-Chymica, &c. p. 411. Lugd. Bat. 1672.

vel infantibus exhiberi poterit. *Dari potest ad* ʒss.: cum aliis purgantibus à gr. viij. ad xv. et plures." Juncker* has made mention of the exhibition of calomel in doses of twenty and thirty grains; and Geoffroy† has recommended it to be given in doses of from five grains to thirty, according to the circumstances of the case. These authors seem, however, not ignorant of the mode of exhibiting this preparation in much smaller doses. But whenever they resorted to this manner of prescribing it, their object appears to have been to affect the system with the mercurial action. Whenever they were desirous of obtaining advantageously its purgative effects, they prescribed it in the large doses above stated, at considerable intervals between each—a mode of exhibiting it founded on their experience of its effects.

Such were the ideas entertained at these epochs respecting the mode of prescribing this remedy; but the opinions since advanced upon the subject have been greatly changed. Since then it has been administered with greater timidity, and actually with greater risk of incurring the consequences dreaded from its more liberal exhibition. Two grains were found to

* Conspectus Medicinæ Theoretico-Practicæ, p. 783. Halæ, 1724.

† Tractatus de Materiâ Medicâ, Vol. I. p. 260. Paris, 1741.

irritate, five were, therefore, inferred to irritate more; and the administration of ten grains was considered a most dangerous practice. Notwithstanding the encomiums lately bestowed upon the operation of scruple doses of calomel, those opinions still retain their hold on the minds of many practitioners, who have not witnessed the effect of this remedy when given in large quantities; and others, who have witnessed the practice in the manner in which it has been revived, have very reasonable objections to the adoption of it. They very justly say, that they have seen twenty grains of calomel given every three or four hours, in acute diseases, and continued for several days, either without much sensible effect, or with very troublesome, and even dangerous consequences; — that they have observed, when the activity of the disease was subdued, violent effects occasioned by the manner in which this remedy had been exhibited, and the danger then most urgent was not that arising from the disease, but from the manner in which it had been treated. This, doubtless, has been the case in many instances in which the old practice of giving calomel has been modified by the revivers of it; and is a serious and just ground of objection, not against the dose in which the remedy was exhibited, but against the unprecedented frequency with which it was repeated. What have been the consequences of this practice? Older prac-

titioners have been made firmer advocates of the propriety of prescribing this medicine in small doses, and of repeating it frequently in the same quantities, under certain circumstances; whilst some modern innovators, witnessing the good effects of scruple doses of the remedy, when given after longer periods than those more frequently recommended by the revivers of the practice, think the benefit will be in proportion to the frequency of the dose, and thus overdo the practice, and bring discredit on the remedy with those who exercise a cooler judgment on the matter.

It is singular, that after so many years' experience of the use of calomel, and after the great diversity of opinion that has been manifested regarding its salutary operation, and the doses in which it ought to be exhibited, some investigation should not have been entered upon as to its direct effects upon the coats of the stomach and bowels, and upon the secretions poured into them, whence a correct and safe practice might be deduced.

At the present day, the opinions of practitioners, both in Europe and in India, are as various regarding the use or abuse of calomel, and the modes of exhibiting it, as at any former period. This is the more singular, as the points in dispute admit of solution, to a certain extent, by means of experiment, and cautious and close observation; and yet the most experienced are

still baffled to account for the operation of this preparation upon the animal economy, in health and disease, beyond a few of its obvious and ultimate effects, which are sufficiently demonstrable to the sight; but this sense, although generally a safe, is not always a sufficient guide to those who are anxious to obtain a precise knowledge of the effects of whatever they use in disease. To this inconvenience we must submit, till we obtain correct information respecting the operations of remedies on the human body, which may direct us in the appropriate exhibition of them in disease. The attainment of such information should, I consider, be the object, as far as he may be able, of every individual belonging to the medical profession, who sees the value of that profession to the community, and is desirous of giving his unbiassed aid towards its improvement. The prejudices of early instruction are difficult to be overcome; they lead us to draw conclusions from inadequate premises, and sometimes to reject useful inferences, because they accord not with preconceived or generally admitted opinions. Ignorance, also, leads us to adopt, without examination, what is generally received, even although the most palpable objections may be found to it in our daily experience.

Influenced, in some degree, by a similar partiality of judgment and indolence in research which I here condemn, I was in the habit of

administering calomel only in moderate doses, until I perused the valuable work of Dr. Johnson; after which I began, in my hospital at Trichinopoly, to exhibit it in doses of one scruple each, to a patient in the advanced stage of dysentery: its action in this instance was so strikingly useful in procuring ease and comfort to the patient, that, although the case was not successful, I determined to give it a trial at the commencement of those acute diseases which we find most distressing and destructive in India, namely, in dysentery, hepatitis, and fever,—diseases which, in general, commence with great excitement, and excessive irritability of stomach. I accordingly adopted this practice, and have followed it for upwards of eight years, and in no instance have I had reason to be dissatisfied with its effects.

Having been, even at that time, prepossessed in favour of large doses of calomel, it was not a difficult matter to make me a convert to the practice; but I adopted it with very different views from those with which it was then recommended, and modified it accordingly, as will be seen in the sequel: nevertheless, so great were the prejudices that existed against this practice, even amongst men of professional eminence and reputation, that I have often doubted my own judgment in suggesting to those gentlemen who were placed under me, on their first arrival in India, the propriety of administering calomel in larger

doses than are commonly thought necessary, although the result of my own experience was so decidedly in favour of the practice; and I have sometimes felt great difficulty in meeting and successfully resisting the various objections which have been made to it. I consequently did not press its use, but gave the confident assurance that calomel could be used in large doses with perfect safety; and established the fact by shewing its effects when so administered by me. A very short time convinced them of its advantages, and the practice became general, from conviction, and not from persuasion.

It is generally believed, and probably it may be true, that many constitutions in India are ruined by the use of calomel; but I am disposed to consider this to be the consequence of continuing it in small doses, long after the necessity for using it ceases.

There is a notion, and it has been inculcated with great industry, by those even to whom we are indebted for reviving the practice of exhibiting calomel in large doses, that where mercury is useful, the mouth must be made sore, and that when the mouth is sore, the patient may be considered safe. This I conceive to be fallacious, and to have done serious injury to the constitution: for it must be well known to every medical man who has at all given his attention to the operation of mercury, that some constitutions can-

not be affected in this way, and that any quantity of any preparation of mercury may be given without making the mouth sore. To continue, therefore, the administration of a remedy during an indefinite period, for an object that cannot be attained, must be attended with danger to the constitution, and loss of credit to the remedy so misused.*

This doctrine of the necessity of salivation, in the hands of a judicious practitioner, might, indeed, not be productive of so much injury, because they who practise with judgment, always having a defined object in view, discontinue the remedy after that object has been attained, whether the mouth become sore or not; but there are those who, from prejudice, inattention, or perhaps a want of knowledge, continue to use calomel till the mouth becomes sore, merely because it is a rule laid down—an absurdity which does not merit refutation.

It is that class of practitioners too, who decry the use of large doses of calomel, who really give infinitely larger quantities, although in small and repeated doses. They probably suppose, that if three or four grains of calomel will purge,

* Mr. Marshall remarks, in page 184 of his interesting work on the Diseases of Ceylon, that "the cases of relapse or long standing receive no benefit from mercury, as the mouth never can be properly affected. In place of ptyalism, the mouth becomes hot and dry, with considerable constitutional irritation."

twenty grains will purge more, and hence carry off its effects by the bowels; and that small doses will enter the system, and produce the expected effect—salivation.

The very reverse of this is the fact: small doses of calomel, from two, three, to four and six grains, will purge, and keep up a considerable degree of irritation in the stomach and bowels, when twenty grains will not; but, on the contrary, will allay the irritation of both, when it results from inflammation of their mucous surfaces. Thus, calomel, in large doses, appears to act as a sedative, as will be proved by the experiments I am about to adduce.

I must, however, be permitted to say, that it would be as absurd as presumptuous in me to doubt that there are cases in which calomel, in small doses, has been and may be useful; nor must it be supposed that I presume indiscriminately to condemn a practice that has been followed and supported by men of talent and experience: my wish is to condemn it only where it is employed without due discrimination, and where the sole end in view is, either to make the mouth sore, or to bring on salivation, without any satisfactory object or therapeutical principle being fulfilled by the practice, and sometimes without a possibility of any benefit resulting from it.

If the constitution is to be charged with mer-

cury, to overcome any disease requiring its specific action—such as venereal disorders, chronic affections of the liver, &c. &c.—perhaps friction on the skin, or the blue pill internally, might be found the safest way of effecting that object; but I have no intention of entering upon this point of practice; my wish is, at present, to shew the direct effects of calomel upon the internal surface, and the secretions of the stomach and bowels, particularly in the more prevalent diseases of India.

The various opinions which have been entertained on the use of calomel in these diseases, have induced me to try some experiments upon dogs, and the result has been so satisfactory, that I think they should not be withheld from the profession; but finding that I have neither time nor means farther to prosecute the inquiry, I submit them, with full confidence that they will be received with indulgence; and in the hope that other experiments will be accurately made, which may farther illustrate the subject.

SECTION II.

Details of Experiments, shewing the Effects of large Doses of Calomel on the Alimentary Canal, &c.

About eleven o'clock, a.m., Dec. 1, 1823, I gave three healthy dogs the following doses of calomel, viz. ʒj. ʒij. and ʒiij.: after they had taken the calomel they were kept in a room, and observed narrowly for twenty-four hours.

The dog which took ʒj. did not appear to feel any kind of sickness till night, when he vomited a little; he was lively the whole time, and ate his food well; had been purged two or three times; dejections very dark gray colour.

The dog which took ʒij. was likewise lively, and ate his food well; vomited two or three times, and was purged more than the other: he passed tape-worms, and the dejections were black.

The dog that took ʒiij. was heavy, and apparently uncomfortable the whole day, but did not vomit at all. He was purged, and passed a very long tape-worm; dejections also black. Although he looked somewhat heavy before he took the calomel, and was apparently dull and uncomfortable during the day on which the calomel was administered,—he improved very much in his appearance on the following day, and was very lively.

At ten o'clock, A.M., on the 2d December, twenty-four hours from the time at which the calomel was taken, the three dogs were hanged; and as the largest dose was given with a view of ascertaining the worst effects of this preparation, I first examined the dog that took it, five minutes after he was dead.

The veins were beautifully injected, the liver healthy, and the gall-bladder *full of bile.*

The external coat of the stomach was of a pale colour, and seemed to be rather thickened.

The small intestines had a peculiarly thickened feel, very similar to what is observed in cases of cholera; but I am not quite sure whether this thickened state is not natural to the healthy intestine of the dog.

The stomach was laid open: its internal surface was considerably corrugated, and of a dusky red colour, but possessing neither the appearance of high arterial action, nor of venous congestion. The corrugations were in a longitudinal, and not in a circular direction.

The small intestines were laid open: their internal surface was loaded with thick, tenacious, cream-coloured matter, such as is generally found in the intestines of those who die of cholera. It appeared that the calomel, in this instance, had no other effect upon the dog than that of diminishing the vascularity of the stomach, as it did not seem to have mixed at all with the secreted

matter of the intestines, or to have acted upon the gall-bladder. Probably the time was not sufficient for the purpose.

The dog which was next opened was that which took ʒij. of calomel.

The appearance of the stomach, both externally and internally, was infinitely more vascular than observed in the preceding experiment. The corrugations were, however, precisely of the same nature as those already described, and the venous system was beautifully injected; but there was a very considerable flow of bile in this dog; and the contents of the duodenum were more fluid and less tenacious.

The dog which took ʒj. was last opened, and in him also the venous system was highly injected; but we were surprised to see a much higher degree of vascularity in the stomach of this dog, particularly at the internal surface, than in either of the two others.

The bile, too, had flowed freely into the duodenum, and the contents of the bowel were highly coloured with bile, and not at all tenacious. The corrugations were of the same character, viz. longitudinal.

Observing that the vascularity of the stomach was greatest in the dog which took the smallest quantity of calomel, I procured a healthy dog, and without giving him any of this preparation, had him hanged, and examined five minutes after

he was dead, in order to see the natural state of the stomach—at least unoperated upon, and unchanged by any medicine. I was greatly surprised to find that the stomach of this dog was infinitely more vascular than that of either of the three dogs already examined, and was in what I really would have considered a high state of inflammation. The corrugations were circular, and more or less vascularity extended throughout the alimentary canal, which was covered with a glairy transparent mucus.

In order farther to ascertain the correctness of these inferences, the following experiments were performed.

At one o'clock, A. M., December the 6th, 1823, I gave to two dogs, that had been kept in a separate room for two or three days, and had been fed upon rice and sheep's head, ʒiij. of calomel each. After taking the calomel they were sick and vomited, but seemed to suffer no other inconvenience, for they ate well, and were seemingly in good spirits.

At eleven, A. M., the 8th December, forty-eight hours after taking the calomel, one of the dogs was hanged; the other was preserved, to shew that no inconvenience attended the ingestion of so large a dose of calomel, and this was amply proved, as the dog continued well, and was in better condition a month after the experiment than he was before.

I examined the dog that was hanged, as soon as possible after he was dead, and the following were the appearances exhibited :—

The veins, as usual, were beautifully injected; the liver was quite sound, and the gall-bladder rather empty. The external appearance of the stomach, which was very much distended with rice, was of a pale colour, with some large blood-vessels spread over it; and, on being laid open, the rice near the pylorus was marked with bile, of a beautifully bright orange colour, while that in the upper part, near the cardia, was perfectly unchanged. On removing the rice from the stomach, it was found that its surface only was tinged with bile.

The stomach, cleared of the rice, exhibited a beautifully corrugated appearance throughout its whole surface, with a peculiarly pale, pink blush; but nothing like excitement or vascularity was evident.

The corrugations were in the transverse direction, and were more marked near the cardia, but were less so at the lower part of the stomach, near the pylorus, where it was deeply tinged with healthy bile. The whole surface of the duodenum was covered with bile, without shewing the slightest trace of vascularity or viscid secretion.

The jejunum was filled with digested food, well mixed with bile; in the lower part of the

intestine the contents were more consistent, and of that peculiar blackish gray colour, which is always produced by mixing calomel with the secretion of the intestine.

The inner surface of the colon was in a high state of arterial vascularity; the transverse ridges being not unlike the valvulæ conniventes in the human small intestine.

The rectum was likewise in an increased state of vascularity, with longitudinal corrugations.

From comparing the state of this dog's stomach with those which I first examined, it seems that the first effect of calomel, in large doses, is not only to diminish vascularity, but also to produce a peculiar action of the fibres of the stomach, and that this organ requires a certain period to elapse before it can resume its natural function.

The appearances, on examination of another dog which had not taken calomel, were as follow:—

The stomach was found corrugated transversely; it was in a much higher degree of vascularity than in the case of the stomach of the dog which had taken calomel, and this vascularity extended throughout the duodenum; but the lower part of the intestinal canal was less vascular than the stomach; its surface was covered with a viscid, glairy, and transparent secretion, adhering to and spread over the whole intestine.

The corrugations of the colon had precisely the same appearance as those in the stomach—they were transverse. The rectum was not at all vascular, and the corrugations in its inner coat were in the longitudinal direction.

The accompanying drawings, taken from the subjects at the time, will shew the actual state of the internal surface of the stomach and intestinal canal more clearly than any description; and from them it will appear that calomel, even in these excessive doses, has the effect of diminishing vascular action, rather than of exciting it, which will account, in some degree, for the scruple doses of calomel at once allaying irritability of stomach and vomiting — a circumstance I have witnessed with astonishment, and for which I never could account till now.

These experiments were followed up by the performance of others, and the results were always the same. I am led, therefore, to the following inferences, the former of which is confirmed by Dr. Yelloly's interesting paper on the vascular appearance of the human stomach, read to the Medico-Chirurgical Society, July 27, 1813,—that the natural and healthy state of the stomach and intestinal canal is high vascularity; and that the operation of calomel in large doses is directly the reverse of inflammatory.

SECTION III.

Of the Influence of Calomel on the Secretions of the Intestinal Canal, and on those of the Liver and Pancreas.

The immediate influence of calomel upon the secretions lining the mucous surface of the intestinal canal, seems to be peculiar, and of a nature which deserves more attention than has been directed to it. It appears to me that this preparation produces a chemical action on these secretions, and that, in consequence of this action, their mechanical properties and appearances become greatly altered. I have often tried its effects upon the dead subject, and have always observed, that the tenacious secretion which is frequently found covering the mucous coat, is completely changed by the admixture of a small quantity of calomel with it *in situ*: this secretion assumes a dark gray colour, becomes more fluid, much less tenacious, and more easily detached from the mucous surface. It is singular that the colour of the mucous secretion is nearly that produced by a combination of calomel and ammonia. It seems to me probable that this secretion occasions a partial decomposition of the calomel, and that a portion of the mercury is left in a state of a dark gray oxide, and imparts its colour to the secretion with which it is mixed.

The dark gray appearance communicated by the calomel to the secretion covering the mucous coat of the intestines, is only observed when there is no admixture of bile; and it is remarkable, that this appearance is precisely the same with that which the alvine dejections assume after the administration of a full dose of calomel, in the acute diseases of India, and before the biliary secretions appear in the stools; thus shewing the effect of the calomel upon the mucous secretions, in conjunction with its purgative operation, before it has succeeded in procuring the flow of bile either from the gall-bladder or immediately from the liver itself.

If, then, it thus separates the tenacious matter covering the mucous coat of the intestines, may not its operation upon this secretion in the duodenum be the means of removing such obstruction from the common duct, as this secretion may be considered to occasion? and thus it may effect a discharge of bile into the intestine, which was only prevented by the mechanical obstruction placed in its way. In this case, the dose of calomel may be considered as acting chemically upon the mucous secretion, and mechanically as respects the duct. But this is only one mode of operation, as respects the biliary secretions, which we may reasonably bestow upon this remedy. Having shewn that the first operation of calomel is upon the mucous secretions of the intestines; that it attenuates, changes, and detaches them

from the surfaces to which they adhere, it seems not unreasonable to infer, that these surfaces are thus left more exposed to the influence of such other doses as may be subsequently administered, particularly when the secretions, which have been acted upon by the previous dose, have been more completely carried off by a cathartic draught, by which the first dose of calomel ought to be followed. These effects having been produced, the influence of the subsequent doses will be more immediately exerted upon the mucous surface of the duodenum, and this influence more readily propagated thence along the canals of the ducts to the gall-bladder, and to the liver itself; and hence, according to the state of the duodenum, and of the biliary apparatus at the period of employing the remedy, will the effects of the calomel upon the hepatic secretion be more or less immediate. The same explanation will hold equally with respect to the pancreatic secretion, and satisfactorily account for the immediate and overpowering flow of bile which often follows a single dose of the medicine, as well as for the frequent exhibition of the remedy before the desired effects are produced by it.

It can scarcely be expected that calomel will at once be absorbed, so as to act by its immediate presence upon the liver and gall-bladder. If it does occasionally thus act, and in this manner increase the biliary secretion, whilst the common

or cystic duct remains obstructed, considerable distress must arise from the increase of the quantity of bile in the gall-bladder, which must be the result. As obstruction of the common and cystic ducts occur sufficiently often to make us prepared to expect it, and as its existence is sufficiently marked by the symptoms, and by effects of remedies, the mode of employing calomel which will most immediately act upon the obstruction ought, therefore, to be adopted. Now, from what has been already said, large doses of calomel, followed by cathartic draughts, are more likely to effect this than small doses often repeated, which will become absorbed, thus act immediately on the liver, and, by increasing the secretion of the bile, also augment the disorder, without removing the obstruction.

Distension of the gall-bladder, from the accumulation of bile, is a frequent occurrence; but it is more often met with as a result merely of inactivity of the organ, and want of tone and energy of the duodenum and neighbouring viscera, or of viscidity of the bile itself, or of the tenacity of the mucous secretion occluding the opening of the common duct, and intercepting the action of irritating matters upon its mouth, than of obstruction of a more permanent nature.

When a loaded state of the gall-bladder is inferred, from the presence of weight and oppression at the epigastrium, with a sense of coldness

at the stomach, and various dyspeptic symptoms, then the purgative operation of calomel will succeed in procuring the discharge of the bile, unless there be a total obliteration of the canal through which it has to pass; and this and other purgatives ought to be employed until dark or dark-green motions are procured—a colour which indicates that the flow of bile has taken place; as shewn by several trials I have made of the appearance which the matters contained in the intestines of recently dead subjects assume, when their tenacious mucous secretion and a small quantity of calomel are mixed *in situ*, and the bile lodged in the gall-bladder is poured upon the whole. In the first instance, as already pointed out, the admixture of calomel with this tenacious mucous secretion and the feculent matter, produces a dark gray and pultaceous compound, similar to the first dejections proceeding from the exhibition of calomel before the flow of bile has taken place; in the second instance, a dark green and more fluid compound is formed, similar to the character of the motions when the biliary evacuation is occasioned by the use of this remedy.

When, therefore, we see the change from dark gray — the colour which calomel alone gives the mucous secretion — to dark green, we may rest satisfied that the ducts are emulged, and that the calomel and cystic bile are acting conjointly upon the bowels. Hence the propriety of con-

tinuing this remedy till healthy action be produced will appear evident.*

I consider the viscid secretion, already described as covering the mucous surface of the digestive canal, to be morbidly increased during many acute derangements, and particularly during those prevalent in India; and I believe that in some of them it is not only thrown out from the mucous surface in increased quantity, but also in a deranged or altered condition from that which characterises it in health. When this is more particularly the case, the intestines, viewed externally, upon dissection of fatal cases of disease, seem thickened in their coats, and they communicate a pultaceous and doughy sensation to the touch. In some cases this is evident even during the life of the patient, upon a careful examination of the denuded abdomen. Upon laying open the intestines, the quantity of this tenacious secretion seems often surprising; and it is chiefly observed in those wherein active purgation had been neglected during the treatment. It is upon this morbid and accumulated secretion that the

* I question whether calomel or bile, or both, acting upon the natural and healthy secretion of the bowel, will produce any discoloration in the motions. It appears to me that the action of calomel in the production of these green motions is almost exclusively exerted upon this morbidly viscid matter, accumulated in the bowels and occasioning disorder, and not upon the secretions of health.

action of calomel is particularly manifested. This medicine prepares it to be acted upon by other purgatives, renders it more fluid, and less adherent to the contiguous surface; and thus leaves the mucous coat in a cleaner and more suitable condition for the influence of whatever remedies may be subsequently administered; and the functions of exhalation, secretion, absorption, &c. unobstructed by the thick coating which lined the surface in which these functions take place.

The experiments shew, that, in addition to these effects upon the mucous and other secretions, full doses of calomel tend to render the mucous surface of the stomach less vascular, whilst it seems to excite the arterial capillaries in the mucous coats of the colon. These effects should be kept in recollection, and should have an important influence in regulating the indications with which calomel ought to be prescribed, and in adapting them to the pathological condition existing at the time of prescribing it. These experiments may serve to explain several phenomena hitherto imperfectly understood, and may, it is hoped, lead to farther research.

SECTION IV.

General Remarks on the Use of Calomel in Disease.

It is not the intention of these observations to recommend the indiscriminate use of calomel; but I maintain, from very extensive experience of its effects, and from the experiments already stated, that in many acute diseases, and particularly in those of India, it may be given boldly, and without risk; and that injurious effects are more likely to be produced by frequently repeated small doses, which keep up a certain degree of irritation and nausea, than by a full dose, given at once, and discontinued when the objects looked for are gained. These objects I conceive to be, to allay irritability, diminish vascular action, and to *cleanse* the intestinal canal of the tenacious matter which often lines it; and, in many cases, almost completely obstructs the passage through it.

In those diseases, therefore, in which we have reason to suppose, from the great irritability of the stomach, the state of the tongue, and the functions of the abdominal viscera, that increased vascularity of the digestive canal is present, with a deranged state, and accumulation of the mucous and other abdominal secretions, as in all the types of fever, dysentery, liver complaints, &c. —calo-

mel, in doses of from ten to twenty grains, either alone or variously combined, according to the circumstances of the case, is an excellent remedy.

In these diseases, I have been generally in the practice of giving, at bed-time, twenty grains of calomel, with one or two grains of opium, and sometimes without the opium, and a smart purgative draught the following morning. This practice I have repeated daily, until the excretions assumed a healthy hue. A tonic laxative was then exhibited, and continued till the natural functions of the bowels were completely restored. In these diseases, I never wished to see the mouth in the least degree affected; whenever this happened, I considered the salutary effects of calomel interrupted, because its use must be then discontinued; and it was my object to act upon the secretions of the intestines, to diminish vascular excitement in the intestinal canal, and not in the most remote degree to act upon the salivary glands.

It is evident from the preceding, that calomel is not a suitable medicine in those cases wherein an opposite state of the digestive canal and of the secretions to that described exists, and that it is calculated to prove injurious under such circumstances. Judgment, and an experienced discrimination, are requisite to the beneficial administration of this remedy under most circumstances; and I consider that it is chiefly owing to the want

of these that it is so often used with little advantage, and that so much diversity of opinion exists amongst medical men respecting the administration of it in various diseases.

Although I was for many years fully aware of its effects in allaying irritation of the stomach, and in procuring abundant discharges of tenacious and morbid matters from the bowels, yet it is comparatively much more recently that I was led to analyse more closely its effects in disease. I always observed, that the frequent repetition of small doses of calomel generally produced nausea and uncomfortable feelings, and completely deranged the functions of the stomach, which was not the case with full doses of this preparation, when given at considerable intervals, and in such a manner as to act decidedly upon the secretions and functions of the bowels, and more particularly when aided by a purgative on the following morning.

When it is desirable to affect the constitution with the mercurial action, and to keep up that action, in order to remove any glandular obstruction, I cannot advise this object to be attempted by means of the exhibition of small doses of calomel, given at short intervals. I have always found this practice attended with unpleasant effects, and the digestive organs not unfrequently injured by it. I therefore recommend the blue pill in preference, and that the use of it, even,

should not be pushed farther at any time than the production of a slight soreness of the mouth, and even not so far as that, if decided benefit follow the exhibition of the remedy, short of this effect.

SECTION V.

Of the Employment of Calomel, in the Treatment of Intermittent, Remittent, and Continued Fevers.

Calomel may be given in the different forms of fever, in order to fulfil three distinct indications. The *first* of these is to diminish the irritability of the stomach, when that state exists, and more particularly when it evidently depends upon increased vascular action in the internal coats of this viscus. The *second* intention with which this remedy may be exhibited, is to correct and to promote the discharge of the secretions on the internal surface of the digestive canal, and those of the large secreting organs, which are generally deranged in this class of diseases: and the *third* indication is to procure, by its means, under certain conditions which will come under consideration, increased action of the great secreting organs, and to excite the functions of the vascular system generally, without, however, inducing its specific operation on the salivary organs.

This last indication is the one which ought more rarely to be resorted to; and when adopted, it should never be with the view of affecting the salivary organs; because I believe, from extensive observation of its effects, that when calomel is given in the febrile diseases of warm climates, to such an extent as to excite these glands, it is then carried too far—so much so, as to occasion injurious effects upon the system. It then generally lowers the powers of life rapidly, and the state of excitement produced by it upon the vascular system has then commenced its termination in exhaustion. In order to elucidate the application of this remedy to the treatment of fever, I will consider it, first, as respects the cure of *intermittent* fever; secondly, as regards the treatment of *remittent* fever; and thirdly, as to its use in the *continued* fever of India; and state, as briefly as I can, my own experience respecting it—which has been not inconsiderable,—the mode I pursue, and the indications I endeavour to fulfil in prescribing it.

1. *In Intermittent Fever.*

I have been in the habit of prescribing calomel in the agues of India, in order to fulfil the three general indications above stated; but I must remark, that, although I have considered it an important means of cure, I have not trusted to it alone, but have either combined it, or alter-

nated the exhibition of it with other remedies, more particularly with other purgatives, and with large doses of bark in the intervals.

As the intermittents of India occur both as primary and secondary diseases, the treatment of them must be varied accordingly. In the primary form of ague, *i. e.* when it appears either in a quotidian, tertian, quartan, or double tertian and quartan form, and not as the sequelæ of remittents, I prescribe a scruple dose of calomel at bed-time, with a view of fulfilling the second general intention with which I resort to it, namely, to correct and to discharge the deranged secretions. I generally order it to be taken at bed-time, with a view of allowing it to operate its effects undisturbedly till the following morning, when it is desirable to procure full and copious evacuations of the morbid secretions which load the gall-bladder and the internal surface of the stomach and intestines; and which the previous dose of calomel has rendered more copious, and more easily operated upon by means of the subsequent purgative. The cathartic draught, which seems to be the best suited to procure the full discharge of the vitiated secretions, after the exhibition of the calomel on the previous night, consists of the infusion of senna with salts and the tartarised antimony. Cases will occasionally occur, wherein it will be advisable to commence the treatment with the exhibition of an emetic;

and where there is little or no affection of the head or stomach, this remedy may be given, and, if possible, in the forenoon; but even then the scruple dose of calomel ought also to be taken at bed-time, and followed up the next morning by the purgative draught.

On the second night of the treatment, the scruple dose of calomel may be repeated and followed by the morning purgative; or ten grains of calomel may be given, with five or six of aloes, and the morning purgative, as before, according as the state of the patient, and the appearance of the tongue and of the excretions, may guide the practitioner. As soon as the tongue begins to become clean, and the excretions assume a healthier character, the cinchona bark, combined with aromatics, may be given in decided doses shortly before the expected paroxysm; but during the exhibition of the bark, calomel with aloes must be taken at bed-time, and an aperient draught in the morning. The bark ought not to be commenced with until the secretions have assumed a healthier character, and until hepatic bile is seen in the excretions; and it ought never to be exhibited whilst pain, tenderness, fulness, and oppression, are felt in the hypochondriac and epigastric regions: — if these instructions be not attended to, and if the bark be exhibited before the deranged secretions are carried off, and whilst symptoms of deranged

action of the liver are present, there will be a great risk of inducing chronic inflammation of the liver and spleen, which, if not immediately attended to, will terminate in obstructions and permanent disease of these viscera. As soon as the disorder yields to this treatment, calomel may be given in much smaller doses, (if given at all,) and it may be combined with aloes; but, in this stage of the disorder I prefer the blue pill, with aloes and myrrh, and tonic laxatives through the day. As I have observed the dependance of the disease, in many instances, upon the full and new moon, the bark may be exhibited more liberally just previous to, and during, the lunar changes; attention being at the same time paid to the state of the secretions and excretions.

It will frequently happen to the Indian practitioner to meet with cases of ague, wherein there has existed much functional and even structural derangement of the liver, previous to the attack of ague under which the patient is suffering at the time. In such cases, calomel may be given in from five to twenty grains, combined with opium and tartarised antimony, with a view of fulfilling the third indication laid down for the exhibition of this medicine, namely, that of exciting the vascular and secreting functions, of determining to the skin, and producing a deobstruent effect upon the liver. In cases of this description, the calomel should be alternated with tonic aperients

and occasional laxatives, in order to keep up a regular and gentle action of the bowels and secreting organs; but, at the same time, care should be taken not to push the calomel so far as to act upon the salivary glands; for as soon as this effect is produced, it may be considered that the vascular excitement occasioned by it is about to terminate in the exhaustion of the tonic powers of the system, and that it will, if not immediately left off, do more harm than benefit to the patient. It will also appear evident to the experienced practitioner, that, in cases of this description, bark cannot be exhibited, if at all, until the derangements of the glandular viscera have been almost, or entirely, removed by the practice already pointed out. And even when this is accomplished, I prefer the adoption of tonic vegetable infusions, combined with gentle laxatives, to the use of the bark; or, if I at all adopt the latter, I prefer it in the form of infusion or decoction, in combination with rhubarb, or any other tonic laxative.

As great irritability of the stomach is often present with the paroxysm of ague, scruple doses of calomel, with one or two grains of opium, may be given, in order to allay this symptom; thus fulfilling the first indication for its exhibition, without interfering with the other objects kept in view during the administration of this medicine.

The observations which may be offered on the

Fig. 4.

Fig. 3

Engraved by J. Stewart

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use of calomel in the cases of ague which commence as remittents, will be made more appropriately under the following head, ague being merely the sequelæ of the remittent disease.

2. *In Remittent Fever.*

The mode I have adopted of exhibiting calomel in this type of fever, will be best explained by the following brief detail of the general treatment of it which I pursue, and which, from long experience of its beneficial effects, I venture to recommend.

In the first place, I endeavour to relieve the most urgent symptom, which is headach, by bleeding, either local or general, according to the habit of body of the patient, and the time he has been in India. I then give an emetic, or a full dose of calomel, according to circumstances. If the tongue be foul, and the patient complain of a bitter taste in the mouth, I generally prefer the former, giving also the latter at bed-time, after the operation of the emetic; and following it up by the exhibition of a smart purgative on the next morning. If these have not the effect of producing very copious evacuations, cathartic enemas are administered; the saline mixture, with the spiritus ætheris nitrosi and the tartarised antimony, is continued throughout the day. Urgent symptoms, such as congestion in the viscera of any of the great cavities, are

narrowly watched, and local bleeding, if necessary, had recourse to, more particularly with a view of relieving determination to the head, liver, or lungs. Calomel is again repeated at bed-time, and a purgative in the morning; and this plan is followed until the more urgent symptoms are subdued and more complete intermissions and regular paroxysms are produced. An alterative and laxative course of medicine is then commenced, and the cinchona bark thrown in, to prevent the return of the paroxysms, which are more particularly expected at certain periods of the moon, as the full and change. When it is ascertained at what time of the moon's age the paroxysms supervene, the bark is given two or three days previous to that, and continued until the period has elapsed; it is then discontinued, and the alterative course again commenced and pursued until the next change of the moon, and so on till the patient recovers. Under this plan of treatment I have never observed any instances of those enlarged abdomens, arising from chronic obstruction of the contained viscera, which are common in India, and which are referred to in my reports. In the remittent type of fever, as well as in the intermittent form into which the fever thus passes, it will be seen that calomel may be required to fulfil, according to circumstances, its three general intentions. It is sometimes necessary to exhibit it in scruple doses

with opium, in order to allay the irritability of the stomach occasionally attending the paroxysm. It is always necessary to give it in order to fulfil the second intention, and then it should be exhibited in the manner, and combined and followed up according to the plan, already detailed. When there exists chronic disease of the glandular viscera of the abdomen, in complication with this type of fever, calomel may be prescribed, so as to fulfil the third indication, in the manner already noticed; and after it has satisfactorily accomplished this, tonics, combined with aperients and occasional laxatives, may be given in order to complete the cure.

3. *In Continued Fever.*

The continued fevers of India, as I have remarked in my reports, are of a decidedly inflammatory character in their first stage. The tongue is generally white,* coated with a glairy mucus, the papillæ large and prominent, and somewhat dry. There is much determination to the encephalon, oppression at the præcordium, and fulness about the pit of the stomach. The bowels are generally costive, the abdomen full, and the skin hot and dry. The stomach and intestinal canal

* This state of the tongue is what I have generally expressed by the term "excited," as it indicates excitement of the system, and that the patient can bear bleeding and other evacuations, which always remove it.

partake largely of this increased action, and their mucous surface may be considered as being covered with a similar morbid secretion to that observed on the tongue and fauces, which accumulates, and becomes more and more viscid and tenacious, and consequently more difficult to be removed, in proportion to the time it is allowed to remain undisturbed.* I consider that this viscid matter keeps up considerable irritation in the system, and contributes greatly to increase the derangement of the chylopoetic viscera, and to prolong the fever. These circumstances are evinced by the copious discharge of vitiated matter from the bowels by means of appropriate purgatives, and the effects following its expulsion.

Calomel, in full doses, by means of mixing with, dissolving, and separating viscid matter of the above description, as shewn by the experiments already detailed, facilitates its expulsion from the bowels, upon the subsequent action

* In fevers, the changes which I have observed in the alimentary canal have been generally a higher degree of vascularity on the internal surface of the stomach and alimentary tube, and a contracted state of the small intestines. If, therefore, calomel has the effect of diminishing vascularity in the stomach, and removing viscid adhesive matter from the coats of the intestines, it must be particularly serviceable in the early stage of all fevers, but especially in the inflammatory and continued fever.

Oct. 12, 1826.—I have this day seen some drawings of febrile stomachs, in the collection of Dr. Thompson, which confirm the observations I have here noticed.

of a brisk cathartic. Nor is the operation of the calomel limited to the mucous surface of the stomach and intestines, diminishing the vascularity of the former, and exciting capillary action in the large bowels; it also promotes the discharge of the contents of the gall-bladder into the duodenum, and corrects and increases the secretions of the adjoining viscera, and of the mucous surfaces with which it comes more immediately in contact. I consider this to be its primary and principal effect in this stage of the disease; it should, therefore, be continued as long as the dejections are viscid or unnatural, either in consistence or in colour, and without reference to the quantity taken; because, so long as the dejections are morbid, calomel alone, and in combination with aloetic purgatives, is the only medicine I have found decidedly effectual in clearing the intestinal tube from this morbid and accumulating matter. In the inflammatory stage of the fever, the practitioner runs but little risk of producing its specific effects, which ought certainly to be avoided; for although it is given in such cases generally after venesection, yet the excitement of the system is too great to allow this effect to be produced. But it must be recollected, that I recommend calomel in this type of fever, entirely with a view of fulfilling the first and second general indications only; and that here, as in the former types of fever, I advise

it to be alternated with active doses of cathartics, and often also to be combined with aloes; thus preventing its absorption into the circulation.

When there is much irritability of the stomach, calomel should be given in full or scruple doses, with opium,* in order to allay that unpleasant symptom; but, when irritability of stomach is not present, it ought to be prescribed at bed-time, as in the former cases, either in similar doses, or in smaller ones combined with aloes. The purgative draught should never be omitted to be given in the morning, regulating its activity in such a manner as to render it unnecessary to repeat it throughout the day, without pushing its cathartic operation too far.

When there seems to be sufficient reason to suspect any degree of spasmodic constriction about the gall ducts, preventing the flow of bile into the intestines, it will then be advisable to give a scruple of calomel, with two or three grains of opium, at bed-time. If, however, from the thick coating of the tongue and fauces, and

* The addition of opium to the calomel will not tend to impede the purgative operation of the latter, when given in the dose above recommended; but, on the contrary, will promote its action, by allaying the spasm which, in the diseases under consideration, is generally present in parts of the small and large intestines, and prevents the full operation of purgatives. Its action in this way being secured by the opium and the purgative draught, there is but little risk of affecting the mouth by the calomel.

the appearance of the dejections, the flow of bile seems to be prevented by the obstruction which the morbid secretions covering the duodenum may offer to the mouth of the common duct, I then prefer a combination of calomel with aloes; giving, also, in both instances, a cathartic draught in the morning. If either of these means fail, an emetic ought to be immediately prescribed; and if there be occasion, it should be followed by either of the means already detailed, appropriating them in the way now described. By this plan of treatment, put in active operation during the acute stage of the disease, the subsequent state of exhaustion is generally prevented; but when the disease has advanced to this latter stage, and the typhoid symptoms are present before the patient comes under treatment, the secretions are then much more vitiated, and accumulated to a much greater extent than in the former stage. The fuliginous coating of the tongue, teeth, fauces, and lips, and the appearance of the motions, sufficiently prove this; but it is evident, that whilst these remain in the *primæ viæ*, cordials and tonics can avail but imperfectly. The obvious intention is to procure their expulsion from the body by such means as will effect the object most readily, without lowering the energies of life. With this intention, from five to ten grains of calomel, in conjunction with rhubarb, aloes, or jalap, should be

prescribed, and repeated according to circumstances; whilst the energy of the system must be supported with wine and beef-tea, or other appropriate means, carried to an extent which the state of the patient requires, attending also to his wants and wishes in the choice of them.

SECTION VI.

Of the Use of Calomel in the Acute Diseases of the Liver and Gall-bladder.

Calomel ought to be employed, next to general and local depletion, in the acute derangements of the biliary organs, in order to produce its purgative effects. But whether the disease be seated more particularly in the membranes and towards the surface of the liver, or in its secreting or parenchymatous structure, or in the gall-bladder or ducts, this medicine should always be exhibited as a purgative only, and never in such a manner as may give rise to its absorption, and consequently to its constitutional effects. When prescribed as a purgative, in the dose of about ten grains, with aloes, &c., and followed by the cathartic draught, as formerly pointed out, it operates as an active derivative to the mucous surface of the large intestines, and elicits the dis-

charge of the biliary secretions from the hepatic ducts and gall-bladder, which, if allowed to remain, would prove a source of irritation to the inflamed parts in the vicinity.

I am anxious, in acute affections of the biliary organs, to avoid the constitutional effects of calomel, because I believe that when these are produced, the energies and vital resistance of the system are thereby impaired, and the presence of this mineral in the circulation tends to keep up in the inflamed part a degree of excitement and irritative action which would otherwise subside, and which, I am persuaded, tends in many instances, when allowed to proceed, to occasion chronic derangements of this viscus, and even to give rise to abscesses, if the inflammation be seated in the glandular structure of the organ.

The observations already offered equally apply to inflammation of the gall-bladder and ducts. These derangements are more generally complicated with acute disease of the liver, but they occasionally occur alone. Their existence may be inferred from the presence of pain, constriction, and oppression, about the pit of the stomach, sometimes darting to the back and shoulder-blade; and, from the irritability of the stomach, particularly after the injection of cold fluids. In such cases, general and local depletions, followed by warm poulticing and fomentations, must be first put in practice, and afterwards calomel and pur-

gatives ought to be prescribed, as already pointed out. It occasionally happens, that, when the inflammation is seated in the cystic or common duct, considerable obstruction is thrown in the way of the discharge of the cystic bile, owing to a partial or complete occlusion of the canal, by means of the lymph thrown out from its inner surface, or owing to the spasm which accompanies the inflammatory state. In these cases, the bile remains pent up in the gall-bladder, occasioning, in addition to the more characteristic symptoms of the disease of the ducts, various phenomena referrible to the stomach, with some degree of jaundice and hypochondriasis. In such cases, although the inflammatory state may not be well marked, yet the experienced practitioner will be led to recognise the derangement existing from the assemblage of symptoms present, and will employ a decided and efficacious plan of cure. He will resort to general depletion, whenever the habit of the patient can admit of it, but more particularly to local depletion, repeated according to its effects, to warm poulticing and fomentations, or to counter-irritation on the surface of the body, and to the administration of calomel in active doses, combined or alternated with cathartics, so as to produce a decided effect upon the secretions and on the functions of the intestines.

SECTION VII.

Of the Use of Calomel in Chronic Disorders of the Biliary Organs.

The simplest form of chronic disorder of the liver is that consisting of imperfect discharge of its functions. This is often the first stage of liver disease, and may lead to acute hepatitis, as well as to chronic forms of this disease; but I believe that the latter are the more frequent result. Imperfect function of the liver generally depends upon debility of the constitution, especially upon debility of the digestive canal. It may be treated by the usual means employed to remove this state, with the addition, or the occasional use, of calomel as a purgative, joined with aloes and myrrh, or with the blue-pill, similarly combined. But in this form of disorder, mercurials ought not to be prescribed so as to occasion ptyalism.

When this simple form of deranged function continues long without correction, it generally terminates in congestion of the portal veins and engorgement of the ducts conveying the bile from the secreting structure of the liver, and is also occasionally complicated with a loaded state of the gall-bladder.

This more complicated form of chronic deranged function may be inferred from a muddy or yellowish cast of countenance, with a heavy expression of the eye, and a dirty yellow tinge of the tunica albuginea. The digestive functions are usually much impaired, and the alvine motions either pale, of a clayey colour and consistence, or particularly dark and offensive. The patient complains of no pain in the region of the liver, but he feels a sense of oppression and fulness at the epigastrium; he loses flesh and strength, his pulse becomes languid and feeble, and his spirits depressed.

In these cases, the treatment may be advantageously commenced by the exhibition of calomel, either alone or with aloes, or the compound cathartic extract, at bed-time, and of the usual purgative draught the following morning. These remedies ought to be continued until the stools assume a healthy appearance, when the blue-pill and aloes may be given at night, and tonics, with laxatives, through the day, until the digestive functions are restored, and the system returns to its accustomed vigour. When these fail in accomplishing their object so readily as may be desired, the nitro-muriatic acid bath should be resorted to; and a blister may be applied over the region of the liver, in addition to the foregoing means.

The derangement now described may be

neglected, or it may be partially removed, in which case it generally returns. In either instance it will terminate, in a longer or shorter time, according to circumstances, in more serious disorder. It will excite vascular action, of a subacute kind, in the substance of the liver, which action, whilst it tends to overcome the obstruction previously existing, also gives rise to the effusion of lymph in the structure of the part where such re-action supervenes. Thus, enlargements of parts, or of the whole of the liver, take place; or the formation of tubercles and scirrhous hardness is the result, even although the patient may not have been the subject of previous acute disease of this viscus. It ought, however, to be remarked, that this, as well as the other chronic derangements of the biliary organs, is often the result of a previous attack or attacks of acute hepatitis; but whether occurring as the sequela of the acute form of the disease, or as the primary disorder, either in a patient who has enjoyed previous good health, or in one who has suffered under some other malady, as intermittent or remittent fever, &c., the symptoms and the treatment will be nearly the same in most of their important constituents.

The form of chronic disorder now under consideration is indicated by the presence of the greater number of the symptoms already detailed, with the addition of a dull pain under the

blade or top of the right shoulder, with uneasiness and occasional pain and fulness in the region of the liver or at the epigastrium, with a white or foul tongue, dry harsh state of the skin, occasional slight paroxysms of fever, &c. This form of disorder requires the exhibition of calomel in the manner already pointed out, in conjunction with local depletions, blistering on the region of the liver, warm poulticing, and the nitro-muriatic acid bath. In this form of disease, the alternate use of large doses of calomel and the cathartic draught is required for a longer period, and the subsequent employment of aperients and laxatives should also be longer persisted in. More caution is requisite in resorting to the exhibition of tonics, and these should never be prescribed uncombined with aperients or laxatives.

In addition to the congestion of the portal veins, with a loaded state of the biliary canals, and sub-acute action in parts of the viscus now alluded to, producing enlargements and tubercles where such derangements are seated, we not uncommonly find upon dissection an engorged state of the gall-bladder, with great distension of the hepatic ducts. In these cases, the bile contained in the gall-bladder is generally dark green, of a thick consistence, and extremely viscid; at other times it is almost as black as tar, and can scarcely be made to pass through the ducts. Occasionally, the bile accumulated in the gall-

bladder is of a straw colour and gelatinous consistence, and with difficulty can be squeezed through the cystic duct. In many instances, wherein a loaded state of the gall-bladder—such as is now pointed out—has been observed, in dissections of those who have died either of fever, dysentery, icterus, or of hepatitis itself, the ducts have been more or less diseased. In some cases they seem to have been spasmodically contracted; in others they have been almost impervious, most probably from previous inflammation. In other instances, they seemed only to have been plugged up by the thick and viscid nature of the secretion; and in a few cases, lymph seemed to have been effused from the internal surface of the inflamed canal, and to have obstructed the passage of bile. These derangements, as far as my own observation goes, have generally been confined to the cystic duct.

Although these pathological conditions of the biliary apparatus have been most unequivocally shewn in dissections of fatal cases, wherein there existed evidence during life of hepatic disorder, yet I have had sufficient proofs of their existence in cases wherein medical treatment has proved efficacious, inasmuch as the symptoms characteristic of these derangements were equally present under both circumstances. These symptoms are, in addition to those already pointed out, a sensation of distension and tightness about the

epigastrium and præcordium, and a feeling of coldness at the stomach, with flatulence. The tongue is generally foul, and covered by a glairy mucus. The pulse is not affected. The stools are deficient in bile, and the bowels generally irregular, sometimes constipated, at other times relaxed. The urine is muddy, dark coloured, and deposits a brownish sediment. There is frequently jaundice, although not always, and the countenance is generally muddy and sallow.

These derangements require the purgative operation of calomel, alternated with the exhibition of the cathartic draught, as already pointed out, and combined, as circumstances may require, with aloes, colocynth, cathartic extract, and occasionally with opium. This treatment should be continued for some time, but it ought not to be trusted to alone. I have generally employed at the same time various stimulating liniments on the hypochondriac and epigastric regions, warm poulticing, blistering, and, if the patient at all complained of pain, I never omitted local blood-letting.

It is possible that the inexperienced practitioner may mistake a loaded state of the colon for these derangements; but attention to the evacuations, and to the operation of the purgatives prescribed, will be sufficient, independently of other appearances, to point out the actual nature of the disorder.

SECTION VIII.

Of the Use of Calomel in Acute Dysentery.

The acute dysentery of India is almost exclusively confined to the cæcum, colon, and rectum, as respects the existence of inflammation of their internal surface; but functional derangement is general throughout the whole digestive canal, even for several days before the dysenteric symptoms become fully formed. It is from attention to this primary derangement that the experienced practitioner is enabled to foretell the consequences, and is led to adopt measures which frequently succeed in averting the disease that would inevitably supervene if it were neglected. Hence it will appear, that confirmed dysentery may often be considered as the result of previous disorder, which might have been checked by judicious treatment, but had been either neglected by the patient, or overlooked by the medical attendant. As the disease becomes developed, the functional disorder runs into vascular derangement, particularly in the large intestines, and this derangement is soon productive of serious alterations of the structure of the interior of this part of the canal.

During the early period of disorder, the state of the tongue, fauces, and stools generally, betrays the existence of an accumulation of the

same kind of tenacious secretion on the villous coat of the digestive canal as has been already described, and the same remedies as those already referred to are required to remove it. In the stage of the disease under consideration, before the dysentery becomes fully formed, much advantage will result from the exhibition of a scruple dose of calomel at bed-time, and a cathartic draught on the following morning. These remedies not only act upon the morbid secretions, but also have the effect of allaying the irritability of the upper part of the canal, and of imparting a stimulus to the vessels of the villous coat of the large intestines, which tends to subvert the disordered action that is commencing in them, — modes of operation which are evinced by the preceding experiments, and the observations I have been enabled to make.

It often appears, from the state of the tongue and of the excretions, and from the appearances observed upon the dissection of the fatal cases, that the morbid secretion already alluded to is thrown out in great abundance upon the internal surface of the stomach and small intestines, through the whole of the progress of the disease. The propriety of removing it, therefore, must be obvious, so that its accumulation, and the changes which would result therefrom, may not become a source of irritation to the inflamed surface of the cæcum and large intestines in the

advanced stages of the disease. And I think there is great advantage derived from removing this disordered secretion by the means already indicated, inasmuch as the calomel seems to change its character in the course of operation, whilst this medicine itself appears to be in some degree decomposed in the course of its admixture with this secretion, and rendered more mild in its action upon the inferior parts of the canal.

These inferences being admitted, more particularly the undoubted effect which the calomel produces upon the secretion which lines the internal surface of the duodenum, and which often obstructs the mouths of the ducts that open into this intestine, it must follow, that a very beneficial operation of calomel in dysentery consists in the removal of the obstruction thus placed in the way of the secretions which flow from these ducts. It appears, in conformity with the laws and objects of nature, that the combined operation of the biliary and pancreatic secretions upon the intestines should be necessary to the healthy discharge of the functions of these organs, and that their entire or partial obstruction must be followed by disorder of those parts, for the purposes and healthy condition of which they are intended. Hence the propriety of endeavouring to remove every obstruction which may stand in the way of the biliary and pancreatic fluids, in order that their salutary operation upon the

diseased surface of the lower intestines may be exerted; and that obstructions are often placed in the way of the flow of these secretions, in cases of dysentery, is a fact which is sufficiently well established, and one which so far merits particular attention, as it forms the basis on which we must often place the most important indications of cure in this disease. Indeed, the presence or absence, and the healthy or disordered appearance, of the biliary secretion in the stools of the dysenteric patient, will prove to the Indian practitioner the most important guides which he can follow in the treatment of this malady — guides which he can never follow too closely, nor with disadvantage. He will often have cause to know, that whenever healthy bile appears in the stools of the dysenteric patient, much advantage will result from it; whilst, on the other hand, whenever the bile is either deficient or disordered, as it very frequently is in this disease, that the patient will never derive permanent advantage from medical treatment until these disordered states shall have been removed. It seems as if the natural stimulus of healthy bile were necessary to the due discharge of the intestinal functions, and that a morbid condition or deficiency of this fluid, if not always one of the efficient causes of dysentery, often at least disposes to its supervention.

From what has been said in my remarks upon

the treatment of disorders of the biliary organs, and from what has been now stated, it will appear sufficiently obvious that the use of calomel, continued in the manner already pointed out, until the disordered state of the biliary secretions generally present in dysentery shall have been corrected, is one of our most efficacious means of cure in this disorder.

In addition to a scruple of calomel given at bed-time, and a purgative draught the following morning, in order to carry off the diseased secretions lining the internal surface of the intestines, to remove biliary obstructions, and to procure a flow of healthy bile, it will often be necessary to exhibit calomel through the day, in order to act upon the skin and upon the liver, through the medium of a partial absorption; but care must be taken not to continue the remedy in this manner until it shall affect the mouth, which ought not in any case to be made sore by it, for the reasons I have assigned when treating of the use of calomel in fevers, (see p. 392). When I have given calomel in this way, I have usually prescribed three grains of it, in combination with three or four of ipecacuanha, and one of opium; and this combination I have generally directed to be taken three times in the course of the day.

It may be proper to mention, that in full and robust subjects the treatment ought to be commenced by one or two copious blood-lettings,

and, if necessary, by the application of leeches upon the abdomen, whenever the disease is fully formed. When the patient's strength and habit cannot admit of one large blood-letting, the application of leeches ought not to be neglected, and they should be followed by semicupium, pediluvium, poultices laid on the abdomen, small anodyne and emollient injections, and afterwards by flannel bandages.

After the acute symptoms are removed, the calomel, in the manner now recommended, should be either altogether discontinued, or given only occasionally, when its operation may be assisted by mild, oleaginous, or saline aperients, as circumstances may require. It will generally, however, be found, in this stage of the disorder, that the blue pill, with aloes and myrrh at night, and tonic laxatives in the morning, will promote convalescence, and avert the chronic form of the disease.

The reader will recollect, that it is not my object to give, under the head of these remarks, a full account of the treatment of dysentery, but merely my wish to point out the manner in which, according to my experience, calomel may be most advantageously used in the cure of this destructive disease.

It has been considered by several physiologists, that the decarbonisation of the blood takes place to a great extent in the internal surface of

the large intestines, and particularly in the cæcum. If such be actually the case, the blood circulating there must be in a highly carburetted state; and, owing to the effects of this kind of blood upon the vessels containing it, congestion must be a frequent consequence whenever the decarbonising process is impeded or interrupted, or whenever the great mass of this fluid is thrown in upon the internal viscera by means of cold applied to the surface of the body, or whatever lowers the energy of the heart's action. Congestion, carried to any considerable extent, will frequently be followed by inflammatory action, either of an acute, sub-acute, or chronic character; and hence will often result confirmed dysentery, attended by destruction of parts in its more advanced stages. There can be no doubt that the cæcum, where it is supposed that the decarbonising process is chiefly effected during health, is the part particularly diseased in dysentery. This fact is sufficiently proved on dissection of fatal cases of the disease, and seems to indicate, that the derangement of the functions of this part quickly proceeds to produce alterations of its structure, owing to the particular nature of these functions, as above explained.

If it be allowed, that one of the effects of large doses of calomel is to occasion increased capillary action in the internal surface of the large intestines, the propriety of prescribing it in this manner,

in the various forms of dysentery, cannot well be disputed, inasmuch as we give a remedy which, independently of its effects upon the secretions, tends directly to remove the congestion in the cæcum now alluded to, to stimulate the over-powered vessels, and by imparting to them a new action, supersedes the morbid one existing at the time when it is exhibited.

SECTION IX.

Of the Use of Calomel in Chronic Dysentery and Diarrhœa.

Chronic dysentery, and occasionally diarrhœa, arise from neglected or ill-treated acute dysentery. The state of the tongue and of the stools must be our guide in the exhibition of calomel in these complaints. When the tongue is coated and foul, and the dejections small, difficult, and consisting of blood and mucus, a scruple of calomel with two grains of opium, or ten grains of calomel with five of antimonial powder and one of opium, may be given at bed-time, and followed by the exhibition of an aperient the next morning. If these act, they generally bring away clay-like and tenacious motions, which shew the necessity of continuing the treatment until

healthier evacuations are procured. If these means fail on their first exhibition, which is often the case, they ought nevertheless to be continued until they produce their effects; but not to the exclusion of other means, as the warm bath and antimonials, so as to determine to the surface of the body; emollient and anodyne injections,—the latter in small quantities, in order that they may remain in the rectum; and warm bandaging. These means having answered their purpose, and the motions having assumed a healthier character, an alterative treatment ought to be adopted, consisting of the blue pill, with aloes, myrrh, &c. and vegetable tonics, with gentle laxatives; and these should be persisted in until the system resumes its vigour, and the digestive and alvine functions are completely restored.

The Indian practitioner will seldom meet with cases of chronic dysentery or diarrhœa, unaccompanied by chronic disease of the biliary organs. The evacuations are usually deficient in healthy bile, and if there be any of this secretion in the stools, it generally presents a morbid appearance. The motions fluid, pale straw colour, with a whitish deposit like dirty chalk; and on the least pressure in the course of the colon, flatus is readily heard to pass from one part of the bowel to the other. In these cases there are an evident deficiency of bile, and a want of power in the large intestine. In cases of this description I prefer the

use of the blue pill, alternating it with a combination of calomel, tartarised antimony, and opium, at night, and the usual purgative draught the following morning. As it is an important object to excite the healthy action of the liver in these cases, and to procure the flow of bile into the intestines, the application of a large blister over the right hypochondrium, in conjunction with the means already pointed out, will prove an efficacious means of accomplishing this object. This plan should be persisted in, without regard to the quantity of medicine exhibited, until the wished-for effect is produced. Calomel, in the doses above recommended, is particularly efficacious in bringing away the viscid and clay-like secretion which lines the intestines and cells of the colon, and in procuring a flow of healthy bile; but in these cases saline purgatives ought not to be selected, as they produce watery motions, exhaust the patient, and have little or no effect upon the biliary and other glandular secretions in this form of the disease; although, in some instances, the Epsom salts may be combined with the bitter aperient mixture* with advantage.

* See page 253 for this mixture.

SECTION X.

Of the Employment of Calomel in Cholera.

It is unnecessary at this place to enter into any details respecting the exhibition of calomel in the epidemic cholera, after the full exposition I have given of the treatment of this disease in the first part of this work, and after the particular mention I have there made of the use of calomel, and of its operation upon the secretions in that disease. I may, however, state, that I have found it an excellent remedy in combination with opium, and occasionally with aloetic purgatives, or alternated with them and other medicines of the same class, in fulfilling the first and second general intentions with which I resort to the use of this remedy, (p. 391). The same general indications have led me to employ this remedy in the common or sporadic cholera of India: and in this form of disease, whether it has been characterised by an unusually copious discharge of the bilious secretions—constituting it the bilious cholera of some authors; or by spasm of the gall-ducts, and an absence of this secretion from the matters ejected from the stomach and bowels—as in the *mort de chien* of other writers, I have generally derived much advantage from its decided exhibition. In the dose of twenty grains, with two or three grains of opium, I have found it successful

in allaying the inordinate action of the stomach in the former variety of the disease, and carrying downwards the biliary secretions, particularly when aided by the subsequent exhibition of a purgative draught, or of emollient diluents, as circumstances may have required. In the latter variety, which has received the name of *mort de chien*, the same combination seems to act upon the biliary ducts, relaxing spasm, or removing obstruction from the mouths of these canals. These ends being obtained, and the general commotion of the system being allayed by means of the combination of this medicine with opium, the second general indication, namely that of correcting and discharging the disordered secretions, is best answered by combining it with such other remedies as circumstances may require—as a few grains of it with ipecacuanha and opium, and alternating its exhibition with gentle alteratives and tonic laxatives.

SECTION XI.

Of the Use of Calomel in several Diseases of Children and Adults.

1. IN CONSTIPATION.

The intestinal canal of children is often loaded with a viscid pultaceous matter, which, when

neglected and allowed to accumulate, often leads to farther disease of a more serious nature, and not unfrequently to the most fatal maladies. Under such circumstances, calomel, exhibited in the manner already described, is the most suitable remedy, as it detaches this matter from the mucous surface of the intestines, and prepares it for the fuller operation of a suitable aperient, subsequently exhibited. When this loaded state of the intestines exists, calomel may be given in a very full dose, and repeated until we are led to conclude, from the appearance of the tongue and of the motions, that this state is removed, and that a healthy discharge of the biliary and other secretions has been established.

If we endeavour to analyse the operation of calomel in constipation, we shall be led, by a close observation of its effects, to conclude, that this operation is *first* exerted upon the accumulated secretion in the bowels, which tends to prolong the derangement whence itself not unfrequently sprung; *secondly*, upon the mucous surfaces themselves, and through the medium of them, and of the nerves supplying the bowels and adjoining viscera, upon the secretions of the mucous follicles, upon the muscular tunics of the intestines, and upon the secretions of the liver and pancreas.

Having exhibited, and repeated according to circumstances, a full dose of calomel to children,

namely, from five to fifteen grains at bed-time, and given a dose of castor oil, or any other purgative, in the morning; and having thus secured the immediate effects of the treatment — the removal of constipation, and a natural appearance of the motions and of the tongue — our next endeavour ought to be to prevent the functions of the intestinal canal from relaxing into their former state of inactivity, and the mucous secretions from accumulating upon the inner surface of this canal. This end is best obtained by exhibiting, immediately after the calomel has performed its purposes, gentle doses of alterative aperients at bed-time, and active doses of tonics through the day. By these means, the general health and strength of the young patient will rapidly improve, and the functions of the *primæ viæ* gradually assume a regular character.

2. *In Worms.*

There is no state which leads more directly to the formation of worms than constipation, and the accumulation in the intestines of the viscid mucous secretion already noticed, which is both co-existent with, and consequent to, the want of action of these viscera. This secretion forms the nidus in which they are generated; whilst the want of action of the parts enclosing them allows them an undisturbed possession of their tenement. The decided benefit resulting from the exhibition

of large doses of calomel in disorders of this kind, is not so much owing to the effects of this preparation upon the worms themselves, as to its influence in detaching the viscid matter in which they lodge from the intestinal surfaces, and thus enabling these viscera, upon the subsequent exhibition of a cathartic, more particularly to exert their action both upon the worms and the matter in which they burrow, as upon foreign substances.

Whilst the stools are deranged, in cases of worms, the use of calomel in large doses, at bedtime, ought not to be relinquished, the patient having abstained from food for five, six, seven, or eight hours, according to his age and strength; for whilst the motions are either slimy, or of a tenacious and putty-like appearance, or whilst they are otherwise unnatural, either in colour, consistence, or odour, it should be inferred that the deranged secretions lining the villous coat are not entirely brought away, and that while any of it remains, it may contain some of those animals which we wish to remove, and which will soon generate a numerous offspring, if allowed to lodge in the bowels.

When, on the other hand, the motions present a natural appearance, then it may be concluded that the deranged secretions are brought away, and that all obstruction has been removed which formerly impeded the flow of the biliary and

pancreatic juices, and the discharge of the secretions of the mucous follicles into the viscera, whose healthy functions they all are destined to promote. This having been effected, light and nutritious diet should be given, and tonic and gently aperient remedies exhibited, with a view of restoring energy to the functions of the digestive and assistant digestive organs, and of preventing the accumulation of the secretions which are so abundantly thrown out from the mucous surface of the bowels of children, and which, when allowed to remain undisturbed and to accumulate, become vitiated, cause various derangements, particularly in organs intimately associated in function with the intestines and sympathising in their disorders, and which furnish a nidus for the generation of those parasitic animals which prey upon the weakened constitution.

3. *In the Marasmus of Children.*

At the commencement even of this disease, the abdomen of children is generally tumid, frequently of a doughy kind of hardness, and the state of the bowels is always irregular. In marasmus more particularly, and indeed in the majority of the disorders of children, the stools are often green, slimy, dark brown, and variegated; and even when they are of a healthy appearance as respects colour, they will be found, on a closer examination, viscid and tenacious.

Sometimes they have a clay-like appearance, at other times they are like glazier's putty; occasionally they contain shreds of coagulable lymph, giving rise to the suspicion that the mucous membrane is coming away in places; and not unfrequently they even resemble the green matter which accumulates on the surface of stagnant water. Whenever motions of the kind now noticed are observed, whether they occur in marasmus, or in any other disease, calomel, in the manner recommended, is obviously indicated. These varied states of intestinal derangement frequently arise from functional disorder of the liver, and occasional obstruction of the gall-ducts. The biliary derangements are generally attended with an interrupted flow of bile into the duodenum, with engorgement of the gall-bladder, in which this fluid acquires new properties, and with sudden discharges of the accumulated fluid into the intestines, as soon as the distension of the gall-bladder occasions re-action of its parietes, and the removal of the obstruction which prevented for a time the regular flow of bile into the duodenum. Hence partly result the varied states of the stools, as respects odour, colour, and consistence; but, in addition to the biliary disorder, there is generally a morbid condition of the mucous surface of the small and large intestines. This surface is evidently loaded with the disordered secretion already noticed, which,

existing in the duodenum, may be considered as one of the causes of obstruction to the regular discharge of the biliary and pancreatic fluids into that viscus, and which obstructs the functions of the lacteal absorbents, and, when it has become vitiated from its long detention in the intestines, produces irritative inflammation of the mucous surface itself; and this inflammation gradually extends to the mucous follicles, and even to the mesenteric glands. Hence, also, the deranged state of the motions may be readily explained, and the shreds of coagulable lymph, resembling pieces of membrane, which are occasionally seen in the motions, are easily accounted for.

In all the diseases of children, and of adults also, but more particularly in those in which the nutrition of the patient is especially deranged, and the dejections unnatural, the naked abdomen should be carefully examined, particularly in the situations of the cæcum, the sigmoid flexure of the colon, and the right hypochondrium. If tenderness and fulness be observable in any part of the abdomen, and in these situations more particularly, and especially if, in addition to these states, a feeling of pulpiness or doughiness be furnished, instead of the natural elasticity of health, the practitioner must not content himself with half measures. He should resort to the decided use of calomel, in the manner pointed out, until the evacuations assume a healthy

appearance, when deobstruent laxatives and aperients may be combined with tonics, in order to restore the vital energy, and promote the functions of the organs of digestion and assimilation.

In disorders of this description, palliatives ought never to be resorted to; otherwise, disease, which at first was more or less confined to the digestive organs, will extend itself to the absorbent and secreting glands, and even to the brain and nervous system. It should also be kept in recollection, that accumulations of viscid matter often form in the cells of the colon in these complaints. These are difficult to remove in proportion to the time that they have been allowed to remain; and they often produce much constitutional disturbance, which is frequently attributed to other causes. These accumulations frequently do not prevent the operation of purgatives, but the motions are generally fluid and somewhat offensive, even although the colour may not be particularly unnatural. This ready procuration of stools upon the exhibition of a purgative, is apt to prevent the real nature of the disorder from being suspected; but whenever the state of the bowels and the stools, the appearance of the tongue, and the tumidity and tenderness of the abdomen, with the continuation of debility, emaciation, and constitutional disturbance, lead us to suspect this condition of the large intestines,—purgatives, as calomel and aloes,

must be exhibited, and soap injections thrown up the rectum. After these have produced the desired effects, alteratives and tonics, as formerly recommended, ought to be prescribed, and continued until the patient's recovery is complete, when change of air and active exercise should be recommended.

Before I quit this subject, it may be observed, that as soon as we perceive the motions assume a dark gray colour, resembling a combination of quicksilver and chalk, we may conclude that the calomel is producing its beneficial effects. This colour of the motions, which arises from the admixture of the calomel with the morbid matter accumulated in the bowels, should be distinguished from the diseased excretions themselves; and the same plan of treatment which gave rise to it ought to be continued until a dark green colour of the stools is observed. This latter appearance of the motions generally proceeds from the flow of the cystic bile into the duodenum, and its admixture with the matters contained in the bowels. The exhibition of the calomel ought not to be put a stop to upon this appearance of the stools, but should be continued until they assume either a bright orange colour, or a natural character and consistence; when the tonic and aperient after-treatment already recommended, may be pursued.

4. *In the Convulsions of Children.*

Convulsions in children assume various characters, and more frequently result from a disordered state of the bowels, similar to what I have already alluded to, than from disease seated within the head itself. The observing practitioner will readily conclude respecting the immediate seat of derangement; but whether it be in the bowels or in the encephalon, or the consequence of the irritation of worms or of teething, the exhibition of a full dose of calomel at bed-time, to be followed in the morning by a purgative draught, will be generally beneficial. The only difference which the exact seat of disease will require, respects the longer or shorter continuance of this treatment, and the addition of other remedies, either during its operation or subsequent to it. If the convulsions arise from the disordered state of the bowels, the plan of treatment inculcated must be followed until the functions of these viscera assume a healthy character; if the convulsions result from the irritation of worms, this treatment must be put in practice until they are expelled; if from the irritation of dentition, attention to the state of the gums and early scarification of them must also be practised; and if from effusion upon the brain, as in hydrocephalus and the last stage of some acute diseases, calomel ought to be given, chiefly as a purgative; and

other means, such as mercurial inunction, and remedies calculated to excite the function of absorption, ought to be employed at the same time.

5. *In Acute and Chronic Hydrocephalus.*

The exhibition of calomel in acute hydrocephalus forms an essential part of its treatment. This disease often originates in disorder of the bowels, and in an obstructed or otherwise deranged state of the abdominal secretions; whilst the derangement of the functions and secretions of the bowels and of the biliary organs, if not the primary disorder, and the cause of the disease of the brain, is generally co-existent with its earliest stages. To correct, therefore, the secretions and functions of the bowels and their allied viscera, at the time when we are also directing our measures immediately to the organ most affected, is one of the most important indications which we can propose to ourselves in treating the disease.

But this attention to the functions of the bowels ought neither to be of a secondary kind, nor should it be of short duration. The exhibition of calomel, in the manner so often alluded to, should be most active, and continued until a most decided effect be produced, both upon the state of the motions and upon the disease itself: but it must be kept in recollection, that the use of calomel cannot alone cure the disease. Other

active means must be also employed, and carried to an extent which the circumstances of individual cases will suggest to the practitioner. These means are various; but, with the exception of local depletion, not any of them admits of such a universal application as the decided use of calomel.

To the treatment of the chronic form of hydrocephalus, many of the precepts are applicable which have been now stated; and the same remarks which were offered at the conclusion of the paragraph on convulsions, will be found to apply to the treatment of this form of the disease.

6. *In Croup.*

Calomel has been recommended in croup in doses of from five to ten grains, given at very short intervals, until spinage-like stools are procured from it. I have certainly found this treatment efficacious, and it agrees with the results of my experiments, and with the views I entertain of the operation of calomel; but I believe that this mode of prescribing calomel frequently interferes with the employment of other remedies which are equally beneficial, and more suited to the urgent circumstances and symptoms so frequently apt to supervene in the course of the disease: I allude to the employment of emetics, particularly when the paroxysms of suffocation threaten the life of the patient. I prefer, in this

disease, to give not less than ten grains of calomel at once, and preferably at bed-time, prescribing also a cathartic draught the following morning; or, if circumstances seem to require the exhibition of this medicine through the day, I think that benefit will generally be derived from the administration of an emetic an hour or half an hour before the calomel is given. My own experience is decidedly in favour of this practice; and I have often adopted it previously to the exhibition of the dose of calomel at bed-time.

The chief advantage of this mode of using calomel in croup consists in the circumstance of its yielding all the advantages which can be expected to be obtained from the remedy, in whatever manner it may be given in this disease, and certainly as much benefit as I have seen accrue from any other mode formerly recommended; whilst it by no means stands in the way of the use of other very efficient remedies, but acts, as it were, jointly with them. Indeed, its efficiency is promoted by the previous exhibition of an emetic, and by active depletions, &c.

7. *In Chorea.*

The deranged state of the secretions of the bowels in chorea has been generally remarked by medical writers; and the dependence of this disease upon the derangement of the *primæ viæ* has been as generally admitted. Without, how-

ever, attempting to inquire whether or no chorea actually originates in the disorder of the digestive canal, or whether both derangements are co-existent, I believe it will not be denied by the attentive observer of the relations and progress of this disease, that the stomach and bowels are not the only abdominal organs which are deranged in their functions at a very early period of the malady. The state of the stools, the appearance of the tongue, the condition of the abdomen, evinced upon a close inspection of it, and the colour and state of the integuments, all prove that the mucous surface of the digestive canal is lined with a viscid and otherwise morbid secretion, which obstructs the functions of the absorbing, exhaling, and secreting vessels seated in this surface; and that the functions of the liver and pancreas are insufficiently performed, and their secretions irregularly discharged into the duodenum, owing either to obstruction at the mouths or in the course of the ducts, or to deficiency of vital action in the organs themselves. The immediate consequences of these states of derangement are, imperfect assimilation, diminished nutrition, and deficient energy of the nervous and muscular systems.

The advantages arising from the continued use of purgatives in chorea, have been frequently stated, and are well known to the profession;

but I believe that I have found a more decided and a speedier effect produced by the exhibition of large doses of calomel at bed-time, and warm cathartic draughts in the morning, than by the usual way of prescribing purgatives. In addition to these, tonic medicines may be given through the day; but it will be better not to commence with the exhibition of them until the stools begin to assume a natural appearance, when vegetable tonics, and afterwards the preparations of iron, may be prescribed. Alteratives at bed-time are generally required in this disease, even after the necessity for the use of the full doses of calomel no longer exists; and aperients combined with tonics are generally required, to promote the vigour of the digestive and assimilating functions, and to excite the action of the secreting viscera.

8. *In Eruptive and other Fevers.*

With respect to the administration of calomel in eruptive fevers and other febrile diseases, especially as they occur in children, I may remark, that the mode of employing this medicine which I have adopted is also applicable to them generally. In most cases it will be advantageously preceded by an emetic, especially at an early stage of the disease.

As soon as either scarlatina or measles manifest themselves, or indeed any other febrile disorder, an emetic may be given in the forenoon,

and from five to twelve, or even fifteen grains of calomel, according to the age and strength of the patient, at bed-time. A purgative draught ought to be exhibited early in the morning, and diaphoretics, consisting of the liquor ammoniæ acetatis, camphor julap, and spiritus ætheris nitrosi, combined with whatever medicines the circumstances of particular cases may require, should be administered through the day. The calomel, either in the same or in diminished doses, must be continued every night, and the aperient draught in the morning, until the motions become natural in appearance.

When the abdomen is full, and the motions very offensive and unnatural in colour and consistence, this treatment will be found particularly beneficial..

The prejudices which exist respecting the exhibition of calomel have led me to enter more fully into the subject of its use in diseases than may appear to many to have been necessary; but I conceive that these prejudices have arisen from the inefficient and hurtful manner in which it has been usually prescribed during the preceding half century, and from the views which have guided practitioners in exhibiting it. There has been too general a desire to produce the constitutional effects of this mineral, and too little atten-

tion paid to its operation as a purgative, when given in large doses; and to its influence upon the secretions, the functions of the bowels, and the condition of the stools, when exhibited with the intention of producing cathartic effects. And even when it has avowedly been given as a purgative, it has usually been prescribed in small, irritating, and inefficient doses; and practitioners have generally contented themselves with resorting to it once or twice, or at most occasionally; and hence they have had no opportunity of experiencing the effects arising from its more protracted use, when given in large doses, and alternated with purgative or aperient draughts, and such other remedies as the nature of the disease and the circumstances of particular cases may have required.

Erroneous notions respecting the operation of calomel have also been long entertained, and a timid mode of exhibiting it has been the consequence. The dose of the medicine has been assigned by authors of modern dispensatories, and other writers, with a precision and a limitation which were by no means requisite; and those who merely followed the recommendations of others, without thinking and acting for themselves, either blindly adopted the same practice, or, if they did attempt to modify it, proceeded no farther than to exhibit the medicine more frequently; and thus they actually resorted to a

more hurtful mode of prescribing it than any other they could have pursued.

The experiments which I have detailed, but still more decidedly, my extensive experience of the effects of large doses of the remedy, when given in the way I have described, shew its propriety; but even this mode, although the safest which can be adopted, requires judgment and tact in the practitioner for its efficacious employment. The empirical and indiscriminate use of the best medicines, and the inappropriate application of the most efficient practice, have been the frequent causes of their unmerited neglect, and of the most erroneous notions respecting them,—causes, however, which can operate only for a time, and which will gradually disappear before the more general diffusion of professional science, and a more accurate and enterprising spirit of inquiry.

INQUIRY

INTO

THE SYMPTOMS AND TREATMENT

OF

CHRONIC INFLAMMATIONS AND ABSCESS OF THE LIVER.

CHAPTER I.

OF CHRONIC INFLAMMATIONS OF THE LIVER.

SECTION I.

Of the Symptoms of Chronic Inflammations of the Liver.

Chronic inflammations of the liver generally commence, and are accompanied, with much disorder of its functions. There are generally appearances of either disordered biliary secretion, or obstruction to the discharge of this fluid into the duodenum. The bile is seldom in due quantity; or, if its quantity be not materially diminished, it is generally much changed from its healthy state. Sometimes it seems to be more abundant than natural, but this generally arises from obstructions to its free discharge into the duodenum, and its consequent accumulation

in the hepatic ducts and gall-bladder. Torpor of the organ, when it accompanies a state of chronic disease of the viscus, may also lead occasionally to attacks of more acute disorder, attended with an increased and vitiated secretion of this fluid; and this effect may proceed from the elements of bile accumulated in the blood, owing to the deficient function of the liver, irritating or exciting it to increased or morbid action. The secretion of bile may, therefore, be various in quantity, according to the particular circumstances of the case; but it is more generally diminished, and almost always somewhat changed in quality, as far as we may judge from the appearance of motions and its influence upon the chyme, as shewn in the digestive and assimilative functions.

As chronic disease of the liver may present every grade of activity, down from what I have denominated active inflammations of the viscus to the slightest deviation from a healthy function, which may be followed by organic change of the organ,—so the symptoms indicating its existence must vary in severity in particular cases, and assume more or less distinctive characters. When the internal structure of the viscus is the seat of the vascular disorder, and if this be of a slight and inactive character, then the symptoms will be often so slight as not to engage the attention of the patient, and, consequently, not to come under the notice of the practitioner until

important organic changes may have taken place in the organ, and the concomitant symptoms, such as wasting of the body, with disorder of the digestive organs, lowness of spirits, &c., shall have engaged the attention of the patient. If the surfaces of the liver become at all involved in the disease, the symptoms are then of a more distinct and acute character; and although they may be in some cases long neglected, owing to the little constitutional disturbance accompanying them, yet they more generally attract notice.

In the severer cases of chronic inflammation of the liver, the symptoms will be nearly resembling those characterising the more active forms of the disease, only much less acute and less marked, and consequently less alarming to both patient and physician. The kind, and pathological relations of the symptoms are, however, the same; they only differ in degree. They also, in some instances, may be correctly considered as indicating the part of the organ diseased; but, in the chronic forms of hepatitis, the relations of the symptoms to particular textures or parts of the biliary apparatus are only to be partially relied upon, and are to be distrusted in proportion as the signs become less acute and less distinctly marked.

In the slightest and most chronic forms of inflammatory action of the biliary organs, the symptoms are often indistinct and not very precise; and it is chiefly in cases of this description, by means of disorder of the digestive and assi-

milative functions, that we are led, in many instances, to infer the existence of disease of the liver. The loss of flesh; the dyspeptic symptoms, particularly the slow and painful digestion, accompanied with acid and acrid eructations, flatulency, nausea, and sometimes vomiting; the torpid state of the bowels, or the pale-coloured, offensive, slimy, tenacious, or watery and muddy motions; the frequent calls to stool, and the scanty, dark, greenish-coloured, and morbid state of the evacuations; the dark and disordered condition of the urine; the distension and oppression at the epigastrium and right hypochondrium; the occasional aching pain and weight in these situations; the uneasiness and pain about the right shoulder or shoulder-blade; the slight acceleration of the pulse towards evening, with an irritable beat, and considerable heat and restlessness through the night; the burning heat of the palms of the hands and soles of the feet in the evening, and chilliness in the morning; the white, foul, and excited tongue; the bitter or disagreeable taste of the mouth; the sallow and tallowy appearance of the countenance, and either yellow or pearly-white colour of the eye; the sickly and leuco-phlegmatic character of the body generally, —are the principal symptoms by which we are guided in determining the existence of chronic inflammation of the internal structure of the liver.

When the surfaces of the liver are the seat of

disease, the pain is generally then more marked; and as the superior or the inferior surface is chiefly affected, so will more or less disorder be referred to the chest in the one case, or to the stomach and bowels in the other. When the superior and exterior part of the right lobe is the seat of disease, then the patient reclines with most ease on the right side, and feels more or less acute pain, or a dragging sensation, upon turning to the left; but when this sensation is felt, we may generally infer the existence of adhesions between the lobe of the liver and the right side. The back is generally the easiest position to recline upon, and a slightly bent posture is often preferred.

In every case of disorder referrible to the liver, careful examination of the region of the organ should be made, both by the hand and the eye. But in no case should the examination be made roughly, or in such a manner as to excite much pain. Although no person can be more desirous that such examination should convey every information possible for it to convey, yet I must protest against examinations being made suddenly and with much force. The patient is seldom prepared for it; and as the muscles are generally relaxed at the time of examination, much violence is apt to add to the already existing mischief. It should be recollected, that the liver, when inflamed or congested, is often also softened in its texture, and more liable to suffer

from a rough mode of examination. We have known cases wherein much increase of suffering was occasioned by it, and wherein chronic and sub-acute attacks of disease were converted by it into active inflammation. More precise knowledge will be generally obtained when the examination is made gently and carefully, than when it is made otherwise. We should also take care, when endeavouring to obtain information in this way, that we satisfy our minds distinctly respecting the existence of tumefaction or distinct tumour, or the absence of either. In chronic inflammations of this organ there is generally much loss of flesh: enlargements of the organ, or distinct tumours from abscesses may then be distinctly felt, and many of their relations with the adjoining parts may sometimes even be detected. This is the case chiefly when tumefaction or abscess takes place on the superior and exterior surface of the liver, or near its anterior edge. When organic changes of the above description are situated in the centre of the liver, or at its superior and posterior aspects, then little more can be detected than tumefaction and fulness in the right hypochondrium and epigastrium, with a descent of the edge of the organ considerably beneath the margin of the ribs. When these changes are situated towards the inferior and posterior surface, then there is generally neither much fulness nor tumour in the

above situations, even when tumour and enlargement actually exist. The stomach and colon give way before tumours or abscesses pointing in this direction; and thus tumefaction is seldom present, and if it be, it is usually of a diffused and undefinable kind. In such cases there is usually much oppression and sense of load at the pit of the stomach, particularly after a meal, with urgent symptoms of dyspepsia, and acrid, acid, and flatulent eructations, sometimes with vomiting or rejection of the contents of the stomach, sometimes without much retching or exertion, and a disordered state of the biliary organs, with irregularity of the bowels, and morbid condition of the stools.

The terminations of chronic inflammation of the liver are various. The greater number of them, however, may be viewed in the light of advanced stages of the inflammatory state; others merely as organic changes, to which this state invariably leads in particular habits and constitutions, rather than as actual terminations of chronic inflammatory action, since the vascular disorder may be considered as still existing. As in the more acute kinds of disease, those forms now under cónsideration may terminate in resolution, by a gradual diminution of the morbid symptoms, and a return of the healthy actions of the diseased organ, and of those related to it in function. They may also give rise to a more

acute form of disease, or to organic changes of a serious and even a fatal tendency. Amongst the former are, active inflammation of the organ, or of the gall-bladder and ducts, and dysentery. The latter embraces all the organic changes to which the organ is liable. These are not generally so varied in warm climates and in India as in temperate countries. The chief organic changes met with in the East, consequent upon inflammations of the liver of a more or less chronic kind, are the following:—

Collections of matter may form in the substance of the organ consequent upon chronic inflammatory action, as well as from the more active state of disease. When the purulent matter is collected into one large abscess, it generally approaches nearly to the appearance of abscess consequent upon active inflammation, and will receive attention when the subject of abscess comes specifically under consideration. Not infrequently, however, very minute abscesses are scattered through the substance of the liver, both with and without the appearance of a distinct cyst, the matter collected being of a firm or cheesy consistence, and yellowish white colour. Sometimes this consistent kind of matter does not fill completely the cavity containing it: it seems as if the watery portions of the matter had been removed by absorption, and thus the more consistent part fills imperfectly the cavities in which

it is contained. The substance of the organ intervening between the purulent deposits is sometimes more vascular than usual, and of a brick-red colour; and at other times not materially changed from the healthy colour and consistence.

The liver, in many instances of long-continued and slight inflammatory action, becomes much enlarged, particularly its right lobe. This appears to arise from the deposit of lymph in the interstices of the structure, which deposit becomes dense, and closely resembles an organised substance, most probably from the absorption of its watery portions. The enlargement is often accompanied also with deposits of purulent matter in various parts of the organ, with a friable state of its texture, and a dark-coloured and congested condition of both its internal structure and surfaces: the latter are generally much darker than natural, and often variegated with lighter streaks and small spots.

In addition to these, tubercles of various forms, and scirrhous structures, are produced in this organ, as a consequence of chronic inflammation. For further information on this subject, I beg leave to refer to the First Volume of my "Researches into the Diseases of India."

SECTION II.

Of the Treatment of the more Chronic Forms of Hepatitis.

The chronic forms of hepatitis I have already shewn to be essentially similar diseases to the more active varieties, and only to differ in the duration of the disorder, and in the texture of the organ more generally the seat of the inflammatory action. The division of hepatic diseases into acute and chronic is entirely arbitrary, and should be adhered to only as far as respects the duration of disease. By many authors, however, it has been applied to forms of hepatitis which are essentially active, although, perhaps, they are not acute as respects the degree of pain accompanying them: and by others this term has been equally extended to those consequences of active disease which consist of various alterations of structure, rather than in slow inflammatory action. As, however, chronic inflammation very frequently remains after the active disease is subdued, and as nearly all the morbid changes met with upon *post-mortem* examination of the liver in India are more or less accompanied with, or related to, slow inflammatory action, either of some part of the liver itself, or of the gall-bladder and ducts, I have included all these derangements under the history of chronic inflammation

of this organ. I have been the more induced to the adoption of this plan by the consideration, that the greater number of those conditions, even did they admit of being recognised in practice, — (a recognition of remarkable difficulty; and if at all to be learnt, must be studied amongst numerous cases of disease,) — require similar modes of practice, and nearly the same remedies for their removal.

Whether chronic inflammations of the liver continue as a consequence of the active forms of hepatitis, or take place primarily, local depletions should be practised, according to the state of the pulse and the appearance of the tongue, and the habit and constitution of the patient. Reference also should be paid by the practitioner to the modes of living followed by the patient, and the length of time he has passed in a warm climate. If depletions have been decidedly practised in the active inflammations of the liver, they should be more cautiously resorted to in the chronic forms of the disease, which sometimes continue after the former have been subdued; but when they have been either entirely or in part neglected in the acute stages, local depletions should be directed with greater boldness in the chronic disease yet remaining, and be repeated according to the effects produced on the disease and on the state of the patient. After the leeches have ceased bleeding, poultices should be applied and frequently renewed; and calomel may be given at

bed-time, as already recommended, and followed in the morning by a purging draught.

In those cases of chronic hepatitis which supervene without any previous acute disease, and particularly such as are accompanied with any evident degree of congestion and enlargement of the viscus, copious local depletions are especially required. This form of hepatic disorder is generally more or less connected with accumulations of morbid secretions and of fæces on the mucous surface of the alimentary canal and in the cells of the colon, which dispose this surface to inflammatory irritation and ulceration, when acted upon by those morbid and acrid secretions of the liver characterising a very large proportion of the cases of chronic hepatitis. The necessity of carrying off these accumulations, when treating this form of disease, at the same time that we endeavour to remove morbid action of the liver, and promote a free and healthy discharge of bile, must be apparent. When, however, the biliary and intestinal secretions are even partially disturbed by the means pursued, disorder will be heightened, as respects the feelings of the patient, until they are completely removed by the repeated exhibition of purgatives. The purgatives may be selected for this purpose according to the circumstances and complications of individual cases; but, generally, a full dose of calomel given at bed-time, and any one of the aperient draughts

already noticed taken early in the morning, will be found most frequently beneficial. After we have accomplished this intention, the calomel may be changed for some milder mercurial preparation, as the blue-pill, or the hydrargyrum cum cretâ; and mild saline aperients with antimonials may be continued through the day, for the purpose of promoting the biliary and intestinal secretions, of removing obstruction when it is present, of determining to the surface of the body, and keeping up a gentle action in the bowels. In chronic cases of this description, dysenteric symptoms are not infrequently present. When such is the case, enemata, either of a purging or of an emollient nature, should be administered, and the pulvis ipecacuanhæ comp. given in combination with the blue-bill at bed-time, and be followed by a dose of castor oil in the morning. In many of these cases much advantage will be derived from the use of a flannel bandage kept constantly applied around the abdomen; and the local depletions which have been practised may be followed by blisters on the epigastric or hypochondriac regions, and these by the nitro-muriatic wash, until a healthy state of the secretions be brought about.

The Nitro-muriatic Solution.—After the acute symptoms have been removed by decided treatment in the active forms of hepatitis, and after the means now noticed have been employed in the chronic states of disease, this remedy should

be resorted to, if any disorder still remain as regards the functions either of the liver itself or of the bowels. The hypochondria and abdomen should be sponged with it night and morning, or the feet and legs should be immersed in a bath prepared with it, as directed below. We have experienced the most decided advantage from this medicine in the form and stage of disorder now under consideration; and, indeed, in all functional disorders of the liver. In the more chronic forms of disease of this viscus, more particularly such as are connected with enlargement of its structure, and a morbid state of the biliary and intestinal secretions, we consider it one of the most valuable remedies we possess.* When

* The nitro-muriatic solution, lotion, or bath, may be made in the following manner: — Into a common quart bottle put about eight ounces of pure water, to which add four ounces of the nitric acid, and four of the muriatic acid, of the strength of the London Pharmacopœia. The "*Nitro-muriatic Solution*" is thus formed, and the bottle containing it ought to be labelled accordingly. If it be intended to use this solution in the form of a bath, from two ounces of it to five, according to the strength of the patient, may be mixed with from two and a half to three gallons of warm water, of a temperature nearly approaching that of the blood, in a high and narrow vessel, and the feet and legs kept immersed in it for about twenty minutes or half an hour, every night before retiring to rest. If the bath does not occasion a pricking or itching sensation in the parts immersed, after twenty minutes have elapsed, the next bath should be increased in strength. Although we have frequently employed this bath, and generally with advantage, we prefer, in many respects, the

this remedy is resorted to, it should be daily employed for some time, according to its effects; but it should not be left off until after two or three weeks' trial, unless it shall have fulfilled the intentions with which it had been prescribed, before that time. After its use has been intermitted for some time, its effects will frequently continue to appear. Even in the more obstinate cases, therefore, advantage from it should not be despaired of, even after it has been laid aside; and although the first course of it may have been ineffectual,

practice of sponging the trunk of the body, particularly the abdomen, with the nitro-muriatic wash.

When the nitro-muriatic solution is to be employed in the form of a wash, from two to three drachms of the solution, prepared as just stated, should be added to a pint of warm water, and the trunk of the body, insides of the thighs, &c. assiduously sponged with it, by means of a large sponge, for about a quarter of an hour daily, or, occasionally, night and morning. We have found great advantage from employing this solution also in the form of poultice, in torpor of the liver and in chronic affections of the organ, attended with enlargement and a deficient and morbid state of the biliary secretion. Occasionally, much advantage will arise from employing this wash in the form of fomentation; the water having been made as hot as 130° or 140° of Fahrenheit, when the acid solution is added. When this is practised, the flannels soaked with the wash should be applied for about an hour or two every night. It may be employed, also, with advantage by keeping cloths wet with the solution over the hypochondria and abdomen, and placing over them warm poultices; both the moistened cloths and the poultices being renewed from time to time.

a second trial may prove decidedly beneficial. It may be employed in the form of bath, lotion or wash, fomentation, and poultice, according to circumstances, as already directed.

Whenever it is our intention to try the effects of this remedy, we should not give mercurials internally, either at the time or for some time afterwards; nor ought the nitro-muriatic bath to be resorted to immediately upon the adoption of a mercurial course; a short time should be allowed to elapse from the mercurial affection of the system, till the employment of this remedy is commenced. Purgatives, however, may be exhibited, from time to time, during the nitro-muriatic course, in order to carry off the secretions of the liver and intestines, which are liable to accumulate, and occasion disorder. For this purpose, the common purging powder, or the bitter purging mixture, either with or without salts, may be given occasionally, and the diet and regimen regulated in the same way as I have stated in my observations on the treatment of diseases of the stomach, and as I shall have to remark in the sequel. The nitro-muriatic solution may be employed in any of the modes I have recommended it, either with a view of restoring the healthy functions of the liver and abdominal viscera, after an acute attack of hepatitis, or with the intention of promoting and correcting the secretion of bile in chronic disorders of the liver, and in those derangements which

are attended with more or less of structural change, whether of the biliary organs themselves, or of the adjoining viscera. Where abscess is already formed, we can scarcely expect any advantage from it, more than from any other remedy. But as *post-mortem* examinations have shewn that abscess has been occasionally formed in the liver, and afterwards absorbed, the structure of this organ having been nearly restored to a healthy state, even where the previous existence of abscess was most evident,—we should not despair of the patient's recovery, as long as the energies of the system admit of being kept up by means of suitable treatment.

During the nitro-muriatic course, considerable advantage will often be derived from the change of air to a moderately cool and pure climate, provided that the change be made with due precaution, and neither suddenly, nor to the extent of affecting materially the sensations of the patient: a feeling of cold ought not to be occasioned by the change; and the patient should not be placed out of the way of the best medical advice. A sea-voyage or excursion, when the advantage of medical care can be enjoyed at the same time, is very often serviceable: but if the voyage be to a colder climate, great care is often requisite on the part of the patient, and much science on that of the medical attendant, to prevent a relapse of the disease.

The Nitric Acid.—This medicine has been

long employed in India, in a state of weak solution, as a common drink in hepatic diseases, and as an alterative remedy, with the intention of promoting the secretion of bile, and restoring its healthy character. For this purpose the dilute nitric acid may be used copiously, and carried as far as six drachms in the twenty-four hours. After some time, generally three or four days, it usually occasions a slight salivation; but its beneficial effects are often produced when given in smaller quantities, without this operation on the salivary glands. The nitric acid usually requires a longer use than mercurial remedies, in order to obtain its good effects. Sir James M'Grigor, in his very interesting account of the diseases of the 88th Regiment (see Edin. Med. Journ. vol. xvii.), appears to consider it equal to mercury in the cure of hepatitis. I believe that it is, on many occasions, a safer remedy than mercury, particularly according to the mode in which this latter medicine was usually prescribed at the time he wrote. Although I have frequently been inclined to question the propriety of directing a course of the nitric acid when mercurials were being exhibited, yet I never saw cause in practice to suppose that any bad effect arose from the continued exhibition of both these remedies within a few hours of each other. Indeed, in some cases I have had reason to agree with Sir James, and to consider the combined operation of mercurials,

especially when employed externally, and of the nitric acid, as being more beneficial than the use of either of them separately.*

To attempt to affect the system with mercury in the active forms of hepatitis, or in many cases of the chronic disease, before the inflammatory action is sufficiently subdued by the more energetic antiphlogistic remedies, we consider to be the cause of its frequently failing to remedy the disease; and we are confident that when thus prescribed, it is often prejudicial, and even calculated to increase the disposition of the diseased organ to run into abscesses. This objection does not, however, apply to the use of nitric acid, nor to that of the nitro-muriatic acid solution; and although these remedies are chiefly beneficial after the more acute symptoms are subdued in

* It will be, however, much safer not to exhibit the nitric acid at the time of prescribing mercurials internally. The practice which we have always observed, of giving only one large dose of calomel in the twenty-four hours, at the time of repose, and of using the nitric acid only through the day, a purgative draught having been administered early in the morning, may have prevented any ill effects from arising out of the employment of both these active remedies. The oxides of mercury, whether in the form of blue-pill or in any other form, certainly ought not to be prescribed when the patient is using any of the mineral acids, either in the form of a common drink, or in conjunction with infusions: mischief may result from the practice, without being observed, or its consequences may be mistaken for those of the disease.

the more active forms of hepatitis, and should therefore only be employed when this indication has been effected, yet the earlier use of them will not be productive of any bad consequences. In the chronic forms of hepatitis, and in most of their attendant organic lesions, they may be serviceable, in assisting the absorbent vessels to remove morbid depositions, and in promoting a healthy state of function in the secreting glands and surfaces engaged in the actions of digestion.

Blisters. — In the treatment of the more acute forms of inflammation of the liver, blisters ought never to be resorted to, as we have already remarked, until after vascular depletions have been employed so decidedly as to subdue the inflammatory action present. When this has been accomplished, then blisters are often of great service, and tend both to prevent a relapse, and to restore the healthy function of the diseased organ. In the form of acute hepatitis which accompanies or supervenes to congestion and torpor of the liver, blistering repeatedly, according to circumstances, is generally beneficial. If, however, blisters are employed too early, and before the inflammatory action has been reduced, they often tend to prolong this action,—and thus a reiteration of the depletory measures is required for its removal. Even in the more chronic forms of the disease, blisters

are seldom of much service until local depletions, poultices, and purgatives, have been employed: after these they are generally productive of much advantage.

Setons or Issues.—In the more protracted cases, and where we have reason to suppose, either from the duration of the disease, or the presence of enlargement, that organic change exists in the liver,—the insertion of a seton or issue is often necessary. After a discharge has been established from them, poultices applied directly over them, and frequently renewed, are generally beneficial. They should be made much below the region of the liver, and so far anteriorly as to allow the patient to dress and attend to them himself. Like blisters, they should follow the depletory measures already recommended.

Tepid Bathing and Vapour Bath are serviceable during the course of the disease, whether in its active or chronic forms, more especially after depletions have been prescribed. In the chronic forms of the disease particularly, they should be followed by frictions, either with a coarse towel or the flesh-brush, immediately upon coming out of the bath. When a full bath cannot either be procured or taken, the semicupium, hip-bath, or even simple pediluvia, are serviceable. Since we have been in England, we have had occasion to know that the sulphur and chlorine baths have proved serviceable in some chronic cases of great

obstinacy, as an auxiliary to a judicious use of deobstruent aperients and alteratives.

The simple vapour baths should be first resorted to; and if benefit be not derived from the use of them, then the sulphur or chlorine fumigation baths may be tried. These latter have not yet been introduced into India, as far as I know; but they may be easily constructed, so as to answer the purpose of trial in a few cases, from whalebone-frames covered with oil-skin, with two or three articles of additional convenience obtained from the usual utensils of domestic economy. These baths, which are now numerous in London, ought not, however, to be confided in as a principal means of cure, but merely as a useful auxiliary to other remedies; and they should be directed by the physician under whose care the patient is at the time, who will prescribe for him the kind of bath of which he should make trial, and a treatment and regimen suitable to the particular circumstances of his case.

Of Emetics.—Although emetics are extremely serviceable in cases of simple accumulations of bile in the biliary passages, yet where any inflammation of the liver exists, or even a tendency to it, the acute character of the disease is generally increased by their exhibition. In many cases of latent disorder of the liver, where inflammatory action smoulders on in the parenchymatous structure of the organ without occasioning any very

manifest symptom of its existence, the action of an emetic, although tending to increase the disease, renders it much more manifest as respects both its nature and relations, and thus, in many instances, leads to the adoption of a decided treatment, which might otherwise have never been resorted to. When emetics are exhibited in hepatitis, they often afford relief for a short time after their operation; but the inflammatory symptoms are soon afterwards increased, if they previously existed; or in the more chronic cases, where they never were very manifest, they become for the first time developed. I have not infrequently seen cases of active hepatitis, which had apparently been subdued, return with much violence, and those consisting merely of chronic disorder changed to very active disease, after the operation of an emetic. Even after all inflammatory symptoms have been quite subdued, whether in the active or chronic forms of hepatitis, the exhibition of an emetic is hazardous. The object with which they are generally given,—namely, to remove accumulations of bile, as indicated by nausea, bitter taste of the mouth, with clamminess, &c.—is much more safely obtained by means of purgatives and cathartic enemata. Although I thus dread the operation of emetics where inflammatory action is or has been apparent, yet I believe that they prove indirectly serviceable in many cases where, but

for their exhibition, no symptom of inflammation sufficient to awaken the attention of the practitioner would have appeared, and hence the treatment requisite to remove the disease would not have been adopted.

Of the Use of Eccoprotics, Aperients, and Deobstruents.—In the more chronic cases of hepatic disease, in addition to the external means already recommended, and particularly after local depletions have been resorted to, whenever pain or uneasiness in the region of the liver manifested itself, a gentle aperient pill should be taken at bed-time, and saline laxatives through the day. The best pill which I can recommend for this purpose is that composed of the aloes and myrrh pill and blue pill, or the following:—℞ Hydr. submur. ℈j.; extract. colocynth. comp. ℈ij.; antim. tartar. gr. j.; pulv. ipecac. gr. jv.; sapon. Castil. gr. x.; ol. car. q. s. M. ft. pilul. xviij. Two of these will generally be found to operate sufficiently, and may be taken every night at bed-time, or every other night. In the majority of cases, however, one of them will prove sufficient, particularly when it is intended to continue the use of them for a considerable time, and when saline or other laxatives are also required through the day. Where the chronic disease of the liver is attended with enlargement, it will generally be found requisite to prescribe the above pills every night, the nitro-muriatic wash being employed

externally night and morning; and a weak solution of the sulphates of soda, magnesia, and potash, either singly or combined, may be given in the morning, and, if necessary, again at midday, in order to keep up a gentle action in the large secreting viscera and bowels. If, however, a weak solution of these salts should occasion frequent and watery motions, with tenesmus, they may be changed for the solution of cream of tartar in tamarind water, or for the solution of the soda tartarizata, or the tartras potassæ. On many occasions, the factitious Cheltenham or Harrowgate salts may be given with advantage; and the Seidlitz powders may also be taken occasionally. Much benefit will generally accrue from changing, after a few days, the saline substances prescribed, particularly if the exhibition of the eccoprotic pill at bed-time, and the salts through the day, produce any degree of tenesmus. The cream of tartar solution may, however, be given, and continued for a longer time, without any risk of inducing this effect. If tenesmus occur, an emollient enema will always afford relief, and the medicines may be intermitted for a day or two.

During this course the diet of the patient should be light, cooling, gently nutritious, and chiefly consisting of farinaceous articles of diet. Spirituous, vinous, and fermented liquors ought to be rigidly avoided; and he should take

gentle and regular exercise, according to his strength.

Of the Employment of Tonics, &c.—After suitable evacuations have been resorted to, and during the continued operation of deobstruent aperients, the patient's strength ought not to be allowed to sink. While the appetite is but slightly impaired, little more is necessary than a gently nourishing diet, chiefly of farinaceous food; but when the appetite flags, and the energies of life begin to fail, gentle tonics, in the form of infusion, are then generally beneficial. These ought to be made the vehicle for the saline remedies now mentioned; and by combining, in this manner, the tonics with the saline aperients, we fulfil the double intention of supporting the energies of life while we remove obstruction and carry off morbid secretions and accumulations. Of the tonics which may be employed, few are more serviceable than the infusion of calumba, the compound infusion of gentian, the cold infusion of cinchona, the decoction of cinchona, or the infusion of camomile flowers. These may be given in various forms of combination, according to the particular circumstances of the case; but they ought never to be resorted to while any lingering disposition to inflammatory action can be traced, nor at any time should they be employed early in the disease.

When we wish to change the treatment, either

during the progress of the disease, or at the commencement of convalescence, from a depletory or antiphlogistic one to that which is less depressing to the powers of life, saline diaphoretics, the decoction of sarsaparilla with the sub-carbonates of the alkalies, or a weak infusion of calumba or of gentian with the sub-carbonate of soda, soda tarrizata, or the acetate of potash, should be first tried in the order now enumerated. If these be borne with advantage, and if the functions of digestion and the strength of the patient seem to require their aid, tonics of a more active nature may be given; but these should be exhibited with caution, and generally be combined with the saline substances already recommended. The best adjuncts to tonics given with saline medicines are, the spiritus ætheris nitrici, the tinctura cardam. comp., or any of the preparations of this class. When, with disease of the biliary apparatus, there evidently are accumulations of fæces and morbid secretions in the bowels,—a complication of disease extremely frequent in India,—the tonic infusions now mentioned are very beneficially combined with the compound infusion of senna, and given either without any further addition, or with some salts and the compound tincture of cardamoms and spiritus ætheris nitrici.

When tonics are prescribed early in the disease, or before sufficient evacuations have been practised, they frequently tend to prolong dis-

order, although their exhibition is attended with benefit for a short time afterwards. But in hepatic diseases more particularly, present advantage ought never to be sought after, at the expense of an increased duration of disorder, with all its consequences.

In many of the slighter chronic affections of the liver, the appetite continues unimpaired, and occasionally it is more ravenous than usual. In such cases the function of digestion is but imperfectly executed, and an unhealthy chyle is generally formed, which, with the quantity of food taken, tends to feed the disease which it is the object to remove. The practitioner, in order to treat the disorder beneficially, must be strict in his regulations respecting diet and regimen in those cases, and must resort to a steady employment of purgatives for a considerable time.

During convalescence, the diet of the patient ought to be a chief object of attention, both on his own part and on that of his physician. Nothing tends more to cause the active forms of hepatitis to pass into the chronic states of disorder than the indulgence of a too liberal or an improper diet; and nothing, in the more chronic diseases of the biliary organs, is more efficient in prolonging the morbid condition, or in converting it into one of an acute form, than similar habits, more particularly if they be connected with the use of spirituous, vinous, or fermented liquors.

It may be added as a general observation, that the desire of these indulgences is often combined with, if it does not actually spring from, chronic disease of the digestive organs, more particularly of the biliary apparatus. Hence the necessity of attending to the necessary restrictions respecting diet and regimen, not only during the period of the continuance of disease and convalescence from it, but even ever afterwards: for, where disease of the hepatic organs has once existed, there is a continued tendency to its return thereby induced whenever the exciting causes are sufficiently powerful for the purpose; and there certainly exists not any more efficient cause in producing this effect than the indulgences of the table, especially when conjoined with the influence of a warm climate and a sedentary mode of life.

CHAPTER II.

OF ABSCESS OF THE LIVER.

SECTION I.

Of the Symptoms of Abscess of the Liver.

When the inflammatory action of the liver is very acute, and accompanied with a congested state of the organ, abscess then rapidly forms, if the disease be not arrested; but its formation is preceded by signs which ought to lead the practitioner to the adoption of measures which seldom fail of preventing its supervention. Abscess of the liver is chiefly owing to some fault in the state of the viscus and constitution of the individual. Although plethoric and robust young men are very subject to attacks of acute hepatitis; yet, under a judicious and decided plan of cure, abscess very seldom occurs amongst them. But it is chiefly in the more insidious cases of inflammation of the substance of the organ, when the symptoms are but ill defined, and by no means acute, that the supervention of abscess is to be dreaded. Such cases are commonly met with amongst the fair-complexioned, the scrofulous, the relaxed and leuco-phlegmatic, the enervated,

those subject to bowel complaints, and the sedentary. In such individuals there is often little or no appearance of existing inflammatory action, and the symptoms complained of are often equivocal. In them also, even where inflammation is most evident, it assumes the chronic or even the passive form; there is often no definite sign which will guide the judgment of the practitioner that abscess is forming, although experience will enable him to decide upon the existence of disease of the liver. In cases of this description, patients often neglect themselves, until it is too late to prevent the termination of the disease in abscess, if, indeed, abscess be not already formed; and when they come under medical care, some consecutive disease may have made its appearance,—such as dysentery and chronic diarrhœa, which may mark the primary malady, and engage the whole attention of both patient and physician.

The symptoms which usher in the formation of abscess in many instances seem to depend more upon the habit and constitution of the individual, or the magnitude and extent of mischief at the period that the suppurative process is beginning, than upon any invariable change in the system necessary to its commencement, and regularly indicated by certain signs. When the inflammatory action going on in an organ or part is not very acute, and is not attended with great general excitement or high symptomatic fever, and when

the constitution is characterised by a scrofulous or tuberculous tendency, then abscess may, and indeed does, supervene in the liver without giving any precise warning, until the very last stage of the suppurative process, when the aggregate of the symptoms may lead us to infer its existence, or its communication with some other viscus renders it manifest. When, on the other hand, the inflammatory action has been acute, the powers of life not materially overwhelmed, and the diathesis and habit of the individual not much in fault, the commencement and progress of abscess of the liver may frequently be detected by the observing practitioner, if his inquiries into symptoms be made with sufficient precision, and understood by the patient.

When the liver is actively inflamed, it often becomes exceedingly large, from previously existing or concomitant congestion; and sometimes it fills the greater part of the superior abdomen, projecting considerably from under the ribs. This is more particularly the case when the superior surface of the liver is the seat of the disease. When the increase of bulk is chiefly in the concave surface of the liver, it extends more in the direction of the stomach and colon, and is less evident upon examination. Adhesions are then frequently formed with either the stomach, colon, small intestines, or right kidney, and if the inflammation terminate in suppuration, the abscess

generally breaks into some one of these viscera, or even into more than one of them. When the liver becomes enlarged and congested with blood, at the same time that it is inflamed, although the danger of supervening abscess is greatly heightened, yet the enlargement and tumefaction evident in such cases upon examination, are no sign that the abscess already exists, or even that the suppurative process has actually commenced: on the contrary, when abscess actually forms, the diffused tumefaction diminishes, it becomes more concentrated and limited; and at last, unless in the very seat of the tumour, the liver seems, upon examination with the hand, actually lessened in size.

Adhesions to opposite surfaces are not always the result of the pointing of an abscess in any particular direction. If it form, and point in the superior and anterior surface of the liver, adhesions to the adjoining parietes frequently are the consequence, and then the operation may be performed with a prospect of advantage in many cases. But it may point in various other directions, and break into the large cavities, or into other viscera, according as adhesions may or may not have formed. When the disease is seated in the superior and anterior part of the organ, with tumefaction, the progress of the suppurative process, and the ripening of the abscess for the operation, may then be very closely and accurately observed.

But when tumefaction and subsequent abscess take place in the superior and posterior part of the viscus, or in the concave surface, then the extent and progress of disorganisation can but seldom be accurately followed; and we have no precise information as to the extent of mischief, unless the collection of matter find its way into the lungs, on the one side, or into some part of the abdominal viscera, on the other.

When abscess points externally, the circumstance may readily be detected; and in some cases, when it is formed in the body of the organ, and points in the direction of some other important organ, it may be so recognised by the symptoms present, and even, in some few cases, by means of the hand; counter-pressure on the posterior parts of the lower ribs being made at the time. It should, however, be recollected, that abscess may form and point either upon the diaphragm or upon the abdominal viscera, in broken-down constitutions, phlegmatic temperaments, and scrofulous habits, without any evident symptoms being present by which we may judge either of its progress and course, or even of its existence: indeed, in such individual circumstances, unless the disease assumes a very active character, the formation or existence of abscess is not often evident until it is about to terminate fatally, having induced great disorder of more than one of the digestive and assimilative func-

tions; and in some cases, if the attention has not been alive to this consequence of disease, it may pass undetected until disclosed by the *post-mortem* examination of the case.

When acute attacks of hepatitis are not subdued by sufficiently decisive treatment in their early stages, they run rapidly into abscess. This consequence of the disease is chiefly to be dreaded when considerable enlargement of the viscus is found upon examination. If abscess actually be formed, and is seated in the convex part of the right lobe, the enlargement is evident over the whole hypochondriac region, the liver extending considerably below the ribs towards the umbilicus, and sometimes across the epigastrium to the left side. When the abscess is likely to point below the ribs, there are generally great tumefaction and increased heat of the surface of the part and its vicinity: frequently there is found a distinct enlargement, particularly in the more advanced progress of the abscess, immediately under the margin of the right ribs. If, however, abscess form on the superior surface of the liver, and point upon the diaphragm, although the enlargement of the organ will be very perceptible, yet there will seldom be felt any great increase of temperature on the surface of the hypochondrium. The abscess may point between the ribs; in this case, a bulging of the false ribs will be observed, and more than usual fulness of the intercostal

spaces, and increased heat in this situation, with considerable enlargement, the liver being felt below the right hypochondriac region, in the epigastrium, and sometimes in the left hypochondrium. This enlargement may exist for a considerable time before matter forms; but in this case there will be no distinct tumour nor increase of heat; when the abscess has advanced considerably to maturity, the undefined enlargement and tumefaction become even diminished, and a distinct tumour is more observable, according to the situation of the abscess and the direction which it may take.

When the abscess is completely formed, and is seated in the superior and posterior part of the liver, the enlargement and tumefaction felt beneath the ribs, previous to, and during the formation of matter, become considerably diminished; but if it be in the inferior and anterior part of the organ, the enlargement becomes more and more reduced and circumscribed, until it assumes the character of a distinct tumour; and the pain, which was often considerable during the period of general enlargement or tumefaction, either altogether ceases, or is now but little felt. For further observations characterising external pointing of abscess of the liver, we must refer our readers to the section on treatment of abscess, and on the operation for abscess when it points externally.

The supervention of abscess of the liver is often not manifested by symptoms of a decided nature, particularly when it is the consequence of a chronic inflammatory action, complicated with dysentery: in such cases especially, the formation of matter may commence and terminate without the appearance of any of those signs upon which the inexperienced are taught to rely. The presence of rigors can seldom be expected; but slight shudderings and formications are more frequently observed. Even when rigors are complained of, they are not diagnostic of the formation of matter in this disease; for the practitioner must remember, that hepatic disease is often complicated with ague, and the rigors may belong to the febrile paroxysm. Rigors may proceed also from that state of stomach induced by irritation and spasm of the gall-ducts, and by the irruption of bile into the duodenum. When rigors supervene to the more active forms of hepatic disease, then more dependence is to be placed upon them, as characterising the formation of matter in the liver; but it is chiefly by the manner of their supervening to the antecedent symptoms, and by the relation which they bear to the phenomena succeeding them, that we should be guided in our judgment respecting them. The inquiries of a medical man respecting the existence of this particular symptom are not always understood; and amongst the lower classes of the community,

the physician should take care to render his meaning perfectly intelligible to his patient in his examination into symptoms. If this injunction be carefully attended to, he will often find that slight rigors have been actually present, although the patient had but a few minutes before denied their existence: and even when they have not been felt, slight shudderings or formications have been perceived.

Sometimes an internal sense of throbbing and fluttering has been felt in the region of the liver, and has been followed by a broad, soft pulse, and night perspirations. The supervention of night perspirations, with a clamminess of the skin of the extremities, is one of the most certain signs of the formation of internal abscess which we possess: but even they ought not to be relied upon alone, but should be viewed always in connexion with the other symptoms characterising the case. The next in importance are frequent cold sweats, but these are chiefly met with in the advanced stage of abscess. Frequent fainting sensations are deserving of considerable reliance on the part of the practitioner. There are also generally much anxiety and oppression at the præcordia, and restlessness. If, during the treatment of hepatitis, we find it a matter of difficulty to affect the system with mercury, vascular depletions having been previously practised with the requisite decision, we may then dread the

existence of abscess. Whether or no the mercurial remedies employed may act in such cases, owing to peculiarities of constitution or diathesis, in producing and accelerating the suppurative process, is a question not readily admitting of decision; but there can be no doubt that the system will not be brought under the full operation of mercury, or that ptyalism will not follow upon the most energetic employment of this substance, when abscess exists, although a slight tenderness of the gums will be produced by it. This circumstance has been proved to me on very many occasions.

When abscess is formed, the tongue is seldom or ever of a natural appearance. At first it is sometimes white, and the papillæ raised or excited: it afterwards becomes of a dusky, brick-coloured redness, or what may be called a beef-steak tongue. At other times it is dry, coated, and of a brown tinge. In the more chronic cases, it is often smooth, chapped, and lobulated, apparently deprived of its papillæ. When great mischief is going on in the liver, without any acute symptoms, the tongue is often an excellent guide, and more to be depended upon than the pulse. In many of the less acute or chronic cases of abscess, the tongue has a peculiar white appearance, with the papillæ raised or excited: it is somewhat dry, but without any coating. This is what I have called an excited tongue,

because I have considered it an index of great vascular excitement going forward in internal structures; and I have often ordered depletions from this symptom alone, the tongue becoming natural as soon as a full depletion was performed. Care should, however, be had not to confound this appearance with a white and moist condition of the tongue, or with a white, yellow, or brown crusted state of this part. The pulse, which at the formation of matter is generally soft and full, is subject to acceleration in the evening, and as the organic change advances, becomes more irritable, quick, and broad. The stools are generally much disordered through the progress of abscess of the liver: they are more or less frequent, are scanty, and consist either of a greenish, watery fluid, with a greenish froth, or of a green, slimy scum, floating on their surface. Sometimes there are also straining and tenesmus; and some blood, with mucus, is occasionally voided. The calls to stool are also, in many cases, most frequent during the night. In hepatic disease, terminating in abscess, and complicated with dysentery, both the small and large intestines become diseased,—first functionally, and afterwards organically; and the patient generally dies of the organic change produced chiefly in the large intestines, frequently before the abscess makes its way either externally or into any other organ. In many cases of hepatitis complicated with dysentery,

more particularly when the hepatitis presents a chronic character, the termination of the inflammation in abscess is accelerated, if it be not altogether produced, by the sudden arrest of the dysenteric disease. In many other cases, the hepatic disease is not apparent until the dysenteric symptoms are subdued; but although the disorder of the liver was not evident, or did not excite notice, while the bowel disease was urgent, we are not on that account to infer that it did not then exist. On the contrary, I believe that in most of the instances of this description the liver was the original seat of mischief, which only became more severe and more apparent when the consequent disorder was abated.

In the more advanced stages of abscess, and particularly when it is seated in the posterior part of the liver, and presses upon the diaphragm, anxiety and oppression at the præcordia become urgent. There are often attacks of dyspnœa, and frequently hiccup. There is sometimes also much difficulty of swallowing; and when the abscess points upon the stomach, this symptom is very generally observed, and is often aggravated by the almost constant presence of flatus in the stomach. In cases where this viscus is pressed upon by an abscess, vomiting is a very general symptom; and in the far advanced state of abscess, vomiting occurs without exertion soon after substances are received into the stomach,

and occasionally the matters taken are ejected through both the mouth and nose at the same moment.

The position in abscess of the liver is sometimes various. It is most frequently upon the back and upon the left side, when the abscess points towards the stomach or colon. Frequently the patient experiences most ease from a sitting posture, and leaning gently forwards. Pain is a very uncertain symptom. At the period of tumefaction or enlargement of the organ, which in the more acute cases precedes the formation of matter, the pain is sometimes considerable, and is afterwards converted into a throbbing or beating sensation, accompanied by shooting or darting pains in various directions, as described under the section on active hepatitis. When, however, abscess is fully formed, a pricking pain is often only felt, and chiefly in the situation where the abscess is pointing. In the more chronic cases, the pain is often not much felt in the region of the liver, and this pricking sensation is the only uneasiness felt in that situation, and sometimes the only notice that we receive of the existence of abscess, unless our attention has been particularly directed to the subject. In such cases, however, pain will generally be complained of on sudden motion, on quick respiration or action of the diaphragm, as in sneezing, coughing, &c.

In many of those chronic cases, the patient,

even when he experiences pain, attaches but little importance to the circumstance. His countenance, however, evinces disease: it is sallow, sunk, and the eye either of a yellowish tint or of a pearly hue. His tongue is white and excited, the spirits depressed, and sometimes he is even melancholy. These symptoms may go on with but little variation for months: but the patient continues to lose flesh, the pulse is quickened in the evening, and when he comes under treatment, the functions of the bowels are found irregular, being either too much relaxed or too costive. In either case the motions are morbid, and always deficient in healthy bile. The consistence of the alvine dejections is often that of soft clay or putty, and they have a peculiar fœtor. In this state of disease, we may infer that the mischief going forward is not very extensive; but it may not be on that account the less serious: it will only be, in the great majority of cases, the longer in arriving at its issue. When, on the other hand, the symptoms are more acute, when the constitutional derangements are great, the tongue dry and smooth, the fever very considerable, and the functions of the alimentary canal much disturbed, then immediate danger is to be apprehended.

Abscess of the liver may terminate fatally without opening externally or into any internal cavity, and without communicating with any other

organ. When such is the case, death is occasioned chiefly by the constitutional disturbance induced, and the disease of the bowels which supervenes in the last stage. When the abscess breaks internally, it is generally in one of two ways:—its external surface either becomes inflamed, and throws out coagulable lymph, which produces adhesions to adjoining parts; or no adhesion takes place, either from the absence of inflammation from its external surface, or from the inflammatory action of the part being insufficient for the production of coagulable lymph and the formation of adhesions. When no adhesions are formed, then the abscess breaks into the abdominal cavity, and excites peritoneal inflammation, which rapidly destroys the patient. When adhesions form, the abscess makes its way to other situations, according to the part of the liver in which it is situate, and the direction it may take. Thus it will make its way through the diaphragm into either the thoracic cavity or into the lungs themselves; or it will break into the stomach, or into the colon, or through the medium of the ducts into the duodenum: it may even communicate with the right kidney, and the purulent collection pass off by the urinary apparatus; but this is a rare occurrence.

SECTION II.

Of the Treatment of Abscess of the Liver.

Even when we have ascertained that abscess is actually formed, we should endeavour to control, as much as may be in our power, the state of the vascular action, either locally or generally; and when we find, from the presence of pain, excited state of the tongue, and character of the pulse, that inflammatory action is considerable, we should reduce it by means of small local depletions, and a cooling and febrifuge treatment and regimen. Our object in this mode of procedure is to prevent the extension of mischief, by lowering the cause from which it proceeds, without materially injuring the powers of life: the intention is to diminish morbid action, yet at the same time to preserve power; and provided this end be accomplished, it matters but little in what way we bring it about. When it is necessary to diminish the morbid action from which the purulent collection proceeds, the diet and regimen of the patient must receive considerable attention from the practitioner: even at the time that he depletes locally, and prescribes aperients with the view of carrying off the morbid secretions and fæcal accumulations, which always increase dis-

order when allowed to remain, he sees the necessity of supporting the energy of the stomach by means of a gently nutritious and cooling diet, allowing the patient no more than the power of his digestive organs can properly dispose of. When these powers fail, he endeavours to rally them by the assistance of gentle tonics combined with refrigerants, such as the nitrate of potass or the mineral acids; knowing well that, if the energies of the vital organs are allowed to sink in the struggle they have to endure against the organic mischief going on in the liver, the purulent formation becomes the more extensive and formidable, the substance of the organ yielding before it, and becoming farther diseased the more that the vital powers of the vessels of the organ are diminished.

When, therefore, the general tumefaction and throbbing in the hepatic region, which accompanies the early formation of abscess, are considerable, and attended with any degree of pain, firmness of pulse, and excitement of the tongue, local depletions should be instituted, and repeated to an extent which the particular circumstances of the case will point out. When these symptoms are present, and the patient has not had rigors, or cold sweats, or formication, or fainting sensations, or a sense of sinking, with anxiety at the scrobiculus cordis, or night perspirations, then we have not sufficient reason to infer the actual exist-

ence of abscess, but it may be imminently impending. In this case our practice must be most decided, and should consist chiefly of large local depletions, which must be repeated until the symptoms of coming danger vanish, or as far as the powers of the system may admit. In those cases where the formation of matter is evident, and the fulness about the margin of the ribs or its vicinity is considerable, the treatment must necessarily depend upon what has been previously done. In these the employment of mercury ought to be entirely laid aside, excepting as a purgative; for attempts to affect the salivary glands with it will generally fail, will merely add irritation to an already irritable pulse, and materially injure the powers of the system — those very powers on which the future recovery of the patient most materially depends. If the local symptoms, and the state of the pulse and of the system, seem to require it, the application of a few leeches in the vicinity of the tumefaction will be generally serviceable; and afterwards poultices should be assiduously employed, with a view of promoting the external pointing of the abscess.

Although the continuance of mercurial preparations, after the existence of abscess is apparent, with any other view than that of carrying off the morbid biliary and intestinal secretions, (when calomel, in the manner in which I have particu-

larly recommended it, is most suitable,) is improper, yet the nitro-muriatic solution may be employed in any of the modes I have mentioned, or the nitric acid may be used in a state of very weak solution as the common drink. I have never seen any very marked advantage derived from the nitric acid pushed to its utmost extent in abscess of the liver; but in the form of a common drink I consider it beneficial, as being gently tonic and refrigerant, and being particularly grateful to the patients, especially when it is found not to disorder the bowels, or add to whatever derangement may be existing in them at the time. It may be also used in combination with tonic infusions.

As the abscess advances externally, the tumefaction is changed to a more distinct tumour, which is generally softest at its apex, with an expanded and somewhat hardened base. If adhesions have formed, some degree of livid redness is generally remarked; but when the abscess is formed in the concave surface of the liver, although there may be general tumefaction observed in the region of the liver, yet a distinct tumour is very seldom present, unless the abscess be seated very near to the anterior edge of the viscus. In those cases where, from the symptoms indicating the existence of abscess, and from the complication with them of certain signs characteristic of disease of some adjoining viscus, we conclude that

the purulent formation is making its way towards some internal organ, little more can be done than to palliate the more urgent symptoms as they arise—moderate febrile action when it becomes at all excessive—support the powers of life, without increasing vascular action—and carry off the morbid secretions, which are apt to accumulate. If, from the presence of thoracic oppression, dyspnœa, anxiety at the præcordia, with a suffocating sensation, cough, hiccup, &c., we have reason to suppose that the abscess is pointing upon, or forming adhesions to, the diaphragm,—antispasmodics, anodynes, and aperients, are requisite; and on some occasions, especially when the presence of pain, the character of the pulse, and state of the patient, seem to indicate the propriety of the practice, the application of leeches over the sternum, or in the direction of the diaphragm, will prove beneficial, especially when followed by fomentations or hot poultices.

If, in consequence of adhesions formed between the walls of the abscess and the diaphragm, and between this latter and the lungs, the abscess empty itself into the bronchia, little else can be done than to palliate the thoracic symptoms attendant upon the disease, and support the strength of the patient. In cases of the above description, I have generally derived much advantage from the exhibition of conium and blue-pill, in the proportion of about two parts of the former

to one of the latter; and when the purulent collection has found its way into the lungs, I have generally derived advantage from the nitric acid in combination with laudanum, hyoscyamus, or conium. When the tongue remains moist; the expectoration copious, easy, and purulent; and the patient complains of little or no pain, and the pulse is devoid of hardness or sharpness, we have also given the decoction of cinchona, with the acid and the narcotics. During the time that this practice is continued, an aperient draught must be given, with the view of keeping up a gentle action upon the bowels. For this purpose, the bitter aperient mixture may be given, either at night or early in the morning. If the patient's strength begins to fail, and if there be night perspirations, and loss of that degree of appetite requisite to support the powers of the system, the tonic decoction, with the acid, as now recommended, should not be omitted; and if, in addition to these symptoms, there be also present signs of general exhaustion, with a weak pulse, a cold, clammy state of the extremities, and cold perspirations, or even a state of the system approaching to this, the decoction of bark should be combined with the spiritus ammoniæ aromaticus, and other warm antispasmodics, in the place of the acid. In cases of this description, particularly when the expectoration is considerable, and no acute or painful symptoms present, the

mistura ferri composita may be given, and, in order to keep the bowels open at the same time, may be combined with the tinctura aloes composita; and the aloes and myrrh pill may be taken every night at bed-time, in a dose sufficient to procure a full evacuation in the morning.

When abscess of the liver is apparently pointing upon the stomach, as indicated by some difficulty of swallowing, by vomiting soon after matters are taken into the stomach; by great thirst, irritability of the stomach, or pumping up of its contents; by the patient reclining either upon the back with the shoulders elevated, or upon the left side, &c.,—little further can be done than to support the energies of the system, while we endeavour to palliate the urgent symptoms.

The diet in the above description of cases requires much attention. It should consist chiefly of farinaceous food, taken in sufficient quantity merely for the wants of the system and the powers of digestion. Tapioca, sago, arrow-root, rice, rice-milk, stale bread, biscuit, bread and milk, bread-pudding, jellies, &c.,—prepared occasionally with a little wine, according to the circumstances and states of particular cases, furnish the most generally beneficial kind of diet. When a little animal food may be ventured upon, either with a view of supporting the energy of the system, or during convalescence, the lightest kinds of fish and the white-fleshed animals should be selected;

but even these should be partaken of only occasionally, and in small quantity.

If abscess of the liver be accompanied with much disorder of the bowels and symptoms of dysentery,—a complication of very frequent occurrence—the disease presents many difficulties to the practitioner. The bowel complaint is generally occasioned in the first instance by morbid secretions, which excoriate and inflame the mucous surface of the bowels, more particularly those parts of them with which they remain in contact for any considerable time. In these cases, purgatives are necessary to carry off morbid secretions, and anodyne and emollient enemata are often required in order to allay the irritation induced in the large bowels. But whilst these measures are being carried into execution, the original seat of mischief must receive attention.

As soon as the abscess has advanced to that state, in process of pointing externally, which shall offer a fair prospect of advantage from giving an artificial exit to the collected matter, the operation for this purpose should not be delayed. But it ought not to be undertaken precipitately, and before the purulent formation has made its way sufficiently near to the external surface of the organ, or before the part at which it points has formed adhesions to the opposite part of the abdominal paries. The practitioner should also be fully convinced, from the state of the tumour

in the hepatic region, and from the history of the case, that abscess actually exists, and that the tumour does not proceed from an excessive accumulation of bile in the gall bladder.

Either in consequence of obstruction of the common or cystic duct, from whatever cause, or from the speedy resolution of inflammations or congestion of the liver, great accumulation of viscid bile sometimes form in the gall-bladder, and give rise to a tumour of this organ at the margin of the false ribs and towards the epigastrium, which may be, and indeed not infrequently actually is, mistaken for abscess of the liver. Care must be taken to discriminate between this pathological condition and the formation of matter in the liver; for it is evident, that if an operation were attempted for the removal of the former condition of disease, death would be the consequence. The accumulation of bile in the gall-bladder, when supervening to congestions of the liver, is often followed, as the formation of matter frequently is, with a remission of the more acute symptoms, and with slight chills: hence the one is more readily mistaken for the other. In the case of abscess, however, the diffused tumefaction preceding the formation of a distinct tumour, with pulsating pain in the region of the liver; the sensation of sinking, with anxiety and oppression; the night sweats, and clammy state of the surface; and the frequent formications or rigors, are gene-

rally, of themselves, distinctive of the suppurative process. In the case of great accumulation of bile in the gall-bladder, the tumour is circumscribed, not preceded by a diffused tumefaction, and is equally soft at its base as at its apex. On the contrary, the tumour proceeding from abscess is at first large and diffused, becoming more circumscribed in its progress, and presenting softness or fluctuation at its apex only, whilst the base is harder and more elevated. These points being duly considered, the existence or the non-existence of abscess may be satisfactorily determined.

SECTION III.

Of the external Pointing, and the Operation of opening Abscess of the Liver.

It is often a point of considerable importance to ascertain the direction in which abscess of the liver is likely to point, after its existence has been inferred to the satisfaction of the practitioner: but this is not always an easy matter; and during its early stages, is more frequently one of supposition than of certainty, unless when it evinces signs of pointing externally. When the abscess proceeds externally, the pain, fulness, and distension in the

right hypochondrium and epigastrium, complained of previous to the commencement of the suppurative process, for a time increase, and afterwards diminish very considerably, leaving, in the place of the diffused fulness and soreness, a tumour, which becomes more and more circumscribed. When the abscess advances beneath the false ribs, or near the epigastric region, it is generally sufficiently perceptible ; but when it points higher up, or more posteriorly, so as to come beneath the ribs, then a bulging out of the hypochondrium is merely remarked, with fulness of the intercostal spaces, and pain and soreness limited almost entirely to one small spot. In the great majority of abscesses, the direction is to the superior and exterior surface of the liver, and hence their communication so frequently with the diaphragm and lungs, when they fail of pointing more externally. But even in such cases, adhesions to the peritoneum opposite to the seat of abscess are not always formed ; for the abscess may advance to the very serous surface of the viscus without coagulable lymph being effused upon this surface in a degree sufficient to attach it to the adjoining parietes of the abdomen. When this is the case, although a circumscribed tumour may point outwardly, yet there will seldom be much redness of its external surface,—an appearance which always indicates that adhesions have formed, or are far advanced in the process